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A-E Construction Specification

PROJECT FILE NO. 021052

Facility Package for the OU 7-10 Glovebox Excavator Method Project

Prepared for:
U.S. Department of Energy
Idaho Operations Office
Idaho Falls, Idaho]

Idaho National Engineering and Environmental Laboratory

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The following Sections of this Specification were prepared under the direction of the Professional Engineer as indicated by the seal and signature provided on this page. The Professional Engineer is registered in the State of Idaho to practice Mechanical Engineering.

Division 1 - General Requirements

01005 -- Summary of Work
01300 -- Submittals

Division 9 – Painting

09900 -- Painting

Division 15 – Mechanical

15202 -- Compressed Air Piping
15409 -- Dust Suppression System

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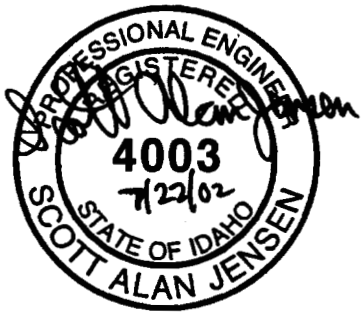

Division 5 – Carbon Steel Welding and Structural Welding

05060 -- Structural Welding
05100 -- Structural Steel and Miscellaneous Metals

Division 7 – Thermal and Moisture Protection

07901 -- Joint Sealants

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The following Sections of this Specification were prepared under the direction of the Professional Engineer as indicated by the seal and signature provided on this page. The Professional Engineer is registered in the State of Idaho to practice Fire Protection Engineering.

Division 13 – Fire Protection

13910 -- Water Mist Fire Protection System
13911 -- Dry Pipe Fire Protection Systems
13914 -- Manual Deluge – Fixed Nozzle System
13916 -- Stationary Fire Pump

Division 16 – Electrical

16721 -- Fire Alarm System
16730 -- Carbon Monoxide Detection System

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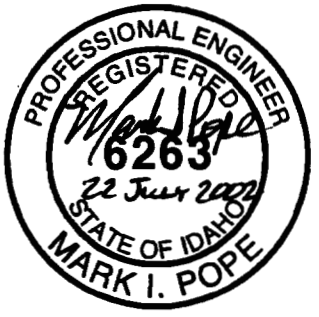

Division 15 – Mechanical

15014 -- Stainless Steel Ductwork Welding
15016 -- Carbon Steel Ductwork Welding
15800 -- Heating and Ventilation Systems
15801 -- Safety Significant Ventilation Systems
15980 -- Testing, Adjusting, and Balancing – (TAB)

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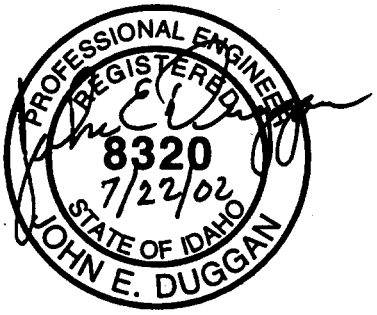

Division 16- Electrical

16000 -- Electrical General Provisions
16109 -- Switches, Receptacles and Wallplates
16110 -- Electrical Raceways
16120 -- Cable, Wire, Connectors, and Miscellaneous Devices
16155 -- Motor Starters (<600 VAC)
16160 -- Panelboards
16195 -- Electrical Identification
16360 -- Disconnect Switches 600 V and Less
16450 -- Grounding
16460 -- Transformers, General Lighting and Distribution Dry Type, Indoor and Outdoor, Under 600 V
16500 -- Lighting
16650 -- Lightning Protection

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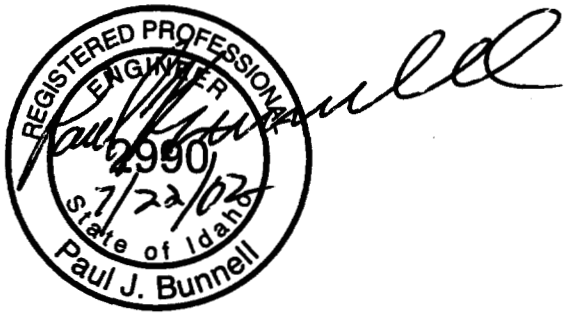

Division 16 – Electrical

16630 -- Closed Circuit System General Provisions

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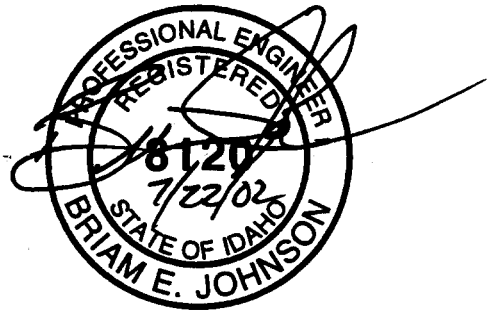

Division 16

16631 -- Emissions Monitoring System
16632 -- Criticality Alarm System
16810 -- Instrumentation General Provision

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SECTION 01005 - SUMMARY OF WORK

PART 1 GENERAL

SUMMARY:

The Subcontractor shall furnish plant, labor, material, equipment, and supplies (except Government-furnished materials and/or equipment) and perform work and operations necessary to construct the Operable Unit (OU) 7-10 Glovebox Excavator Method Facility, Facility Package complete, in accordance with the subcontract drawings and these specifications.

Drawing sheets A-5, A-6, A-8, and A-10 show a suggested sequence of installation (phases) of equipment and structures. The intent of these drawings is to call special attention to coordination issues that must be addressed. The information shown on these drawings is not all-inclusive and is not intended to be a substitute for proper coordination between all of the parts of work to be performed. The inclusion of these drawings does not relieve the Subcontractor of the responsibility of successful installation of all items of work associated with this subcontract. The phases are as follows:

1. Phase I Part A – "Installation of Gloveboxes, Platforms, and HEPA Filter Assemblies", Drawing Sheet A-5
2. Phase I Part B – "Installation of Structures Inside of RCS Before Overburden Removal", Drawing Sheet A-6
3. Phase II – "Installation of Equipment Outside the RCS Before Overburden Removal", Drawing Sheet A-8
4. Phase III – "Installation of Structure & Equipment inside of the RCS After Overburden Removal", Drawing Sheet A-10

Section Includes but is not limited to the coordination of and/or installation of the following:

1. System installations requiring vendor oversight shall be coordinated with the Contractor and Subcontractor as identified in the Construction Documents.
2. Subcontractor shall procure all equipment except as otherwise noted in the Schedule "X" or designated "By Others".
3. Subcontractor shall test all equipment and systems installed unless otherwise noted in specification sections.
4. Subcontractor shall be responsible for final coordination of all RCS and WES penetration reinforcement and/or sleeving, details for attachments of utility and equipment to structural members and closure of construction opening of the WES. Details will be provided per Appendices E and F.

5. Facility Structural and Architectural:
   - Facility floor structure final finish
   - Painting including but not limited to the facility floor structure, exterior exit stair assemblies, ductwork, miscellaneous equipment supports, framework, mechanical and electrical systems and touchup of existing structures, i.e., exhaust stack, etc.
   - Personnel lockers
6. Facility Electrical:
   - Electrical distribution systems, panel boards and transformers.
   - Lighting, normal and emergency.
   - Grounding and lightning protection.
7. Facility Heating, Ventilation, and Air Conditioning (HVAC):
   - Heating, ventilation, and filtration systems.
8. Facility dust suppression system:
   - Dust suppression system complete.
9. Facility breathing air system:
   - Breathing air system complete.
10. Facility plant air system:
   - Plant air system complete.
11. Facility Fire Protection:
   - Dry pipe systems
   - Deluge system
   - Packaging glovebox system (PGS) fire mist system
   - Fire extinguishers
   - Water supply and fire pump for fire mist system
   - Fire alarm system
   - CO monitor system.
12. Instrument, Controls, Data, Sampling Equipment, Monitoring, and Recording:
   - Fabrication and installation of hardware for radiation monitoring equipment
   - Power and signals to the stack emissions monitoring systems
   - Closed-circuit television (CCTV) systems
   - Criticality alarm system.
13. PGS:
   - Final assembly and alignment of gloveboxes and cart support structure in the Retrieval Confinement Structure (RCS), per Appendix A
   - Placement of gloveboxes and final interface connections per Appendix A
   - Connection of electrical service at the three junction boxes supplied with the PGS
   - Lift tables.

14. Drum Loadout Enclosure:
    - Drum Loadout Enclosure complete.
15. Cart Protection Structure:
    - Cart protection structures in the RCS.
16. Excavation System Excavator:
    - Excavator and the excavator supports
    - Outer boot seal to the RCS.

Reference the following table for a more detailed description of equipment and system components and associated work to be performed.

SAFETY CATEGORY:

This subcontract involves the construction, installation, and/or fabrication of Safety Significant (SS) and Low Safety Consequence (LSC) structures, systems, and components (SSC). As such, this subcontract has been designated Quality Level 2. The Subcontractor's attention is directed to the Safety Significant and Low Safety Consequence designations for specific equipment shown on the drawings and identified on Form 414.02, Safety Category Designation and Record, and/or Form 414.70, Safety Category List, included with this subcontract. Receipt inspection of these safety-related SSCs is required per PRD-5008, which is contained in the Subcontractor's Requirements Manual. Any penetration through the RCS structure, or as noted elsewhere, shall be safety significant.

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
PACKAGING GLOVEBOX SYSTEM (PGS)				
Packaging gloveboxes	• By others	• Facilities Package Subcontractor (SPC-389) to install	SS	The glovebox supplier will provide a preliminary set of installation, assembly, and handling instructions 3 weeks after award of subcontract. This information will be supplied to the Facilities Package Subcontractor (SPC-389) by Bechtel BWXT Idaho, LLC, (BBWI) during the bid process. The glovebox supplier will provide a detailed set of installation, handling, and assembly instructions with the delivery of the PGS.

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
PGS glovebox lighting	• By others	• Facilities Package Subcontractor (SPC-389) to perform final installation and connection to power	CG	The glovebox supplier will provide a preliminary set of installation, assembly, and handling instructions 3 weeks after award of subcontract. This information will be supplied to the Facilities Package Subcontractor (SPC-389) by BBWI during the bid process. The glovebox supplier will provide a detailed set of installation, handling, and assembly instructions with the delivery of the PGS.
Operating platforms	• By others	• Facilities Package Subcontractor (SPC-389) to install	CG	The glovebox supplier will provide a preliminary set of installation, assembly, and handling instructions 3 weeks after award of subcontract. This information will be supplied to the Facilities Package Subcontractor (SPC-389) by BBWI during the bid process. The glovebox supplier will provide a detailed set of installation, handling, and assembly instructions with the delivery of the PGS.
PGS automatic fire suppression system within the PGS structure • Mist nozzles	• Facilities Package Subcontractor (SPC-389) to install	• Facilities Package Subcontractor (SPC-389) to install	CG	
• **Notification equipment** • Isolation valves • Supply system	• Provided by Facilities Package Subcontractor (SPC-389), Fire Protection Subcontractor	• Facilities Package Subcontractor (SPC-389) to install	CG	

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
Glovebox light curtain	• By others	• Facilities Package Subcontractor (SPC-389) to install	CG	
Drum-loadout enclosures (tents)	• By others	• Facilities Package Subcontractor (SPC-389) to assemble and install	CG	
Drum-loadout lift tables	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
Drum-loadout tent fire suppression	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
Material transfer cart system • Cart crush pads	• By others	• Facilities Package Subcontractor (SPC-389) to install	CG	The glovebox supplier will provide a preliminary set of installation, assembly, and handling instructions 3 weeks after award of subcontract. This information will be supplied to the Facilities Package Subcontractor (SPC-389) by BBWI during the bid process. The glovebox supplier will provide a detailed set of installation, handling, and assembly instructions with the delivery of the PGS.

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
Cart protection structure	• Fabricated by Facilities Package Subcontractor (SPC-389)	Facilities Package Subcontractor (SPC-389) to be removed for final install by others	CG	Final leg of cart protection structure after overburden removal and end-effector stands installed by others
Cart protection spill pan	• Fabricated by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) install	CG	
EXCAVATOR SYSTEM				
Excavator	• By others	• Facilities Package Subcontractor (SPC-389) to install excavator on stands • Excavator Modification Subcontractor to perform necessary on-site modifications	CG	
Excavator/RCS interface weld-on plates Excavator Inner Seals	• Procured by NQA-1 certified Excavator Modification Subcontractor	• Installation by others	SS	

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
Excavator/RCS interface seal material Excavator Outer Seals	• Procured by NQA-1 certified Excavator Modification Subcontractor	• Installation by others	SS	
Excavator stops Excavator shims and crews for swing boom	• Procured by NQA-1 certified Excavator Modification Subcontractor	• Installation by others Facilities Package Subcontractor (SPC-389) to make final adjustments	LSC	
Excavator stands	• Procured by NQA-1 certified Excavator Modification Subcontractor	• Facilities Package Subcontractor (SPC-389) to install	LSC	See Appendix D
Excavator bulkhead fittings	• Procured by NQA-1 certified Excavator Modification Subcontractor	• Installation by others	LSC	
Excavator drip pans	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	Field locate after final installation of excavator, reference Appendix D, coordinate with design engineer and field engineer.
Excavator exhaust system • Exhaust ducting • Exhaust fan	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
Probe puller caps (16 ea.)	• Provided by Facilities Package Subcontractor (SPC-389)	• Installation by others	CG	Reference: Drawing S-18
End-effector stands	• Provided by Facilities Package Subcontractor (SPC-389)	• Installation by others	CG	
Drum sizing tray	• Provided by Facilities Package Subcontractor (SPC-389)	• Installation by others	CG	
Material bin – absorbent material in RCS	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
Material bin - fire suppressant material in RCS	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
RETRIEVAL CONFINEMENT STRUCTURE (RCS)				
RCS structure	• Buy as GFE under NQA-1 waiver with RCS-specific Quality Program Plan	• Installation by others • Have Manufacturer's Representative on site during installation	SS	

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
Gloveports (4) in RCS structure	• By others	• Facilities Package Subcontractor (SPC-389) to install	SS	
Guard rail/fall protection	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
H&V SYSTEM (Weather Enclosure Structure [WES], Retrieval Confinement Structure [RCS], and Packaging Glovebox System [PGS])				
H&V ductwork (past HEPA filters)	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
H&V ductwork (up to HEPA filters)	• Provided by Facilities Package Subcontractor (SPC-389),	• Facilities Package Subcontractor (SPC-389) to install	SS	
HEPA filter housings – inlet and outlet • Heaters • Demisters on outlet • Isolation damper	• By others	• Facilities Package Subcontractor (SPC-389) to install	SS	
Fans	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
Heaters	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
Vacuum relief damper with actuator	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	LSC	
WES penthouse ductwork and damper and filter assembly	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
ELECTRICAL POWER SYSTEM				
Optional standby generator	• Existing	• Set in place only by others. • Facilities Package Subcontractor (SPC-389) to connect	CG	Startup testing of generator performed by others.
Electrical power cabling/wiring to Load Center	• Portion of the cabling existing	• Relocation of existing mining cable and installation by others	CG	
Electrical power cabling/wiring from Load Center to Project • Switches and receptacles • Cable trays • Conduit form Load Center to	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	NOTE: Wiring within the PGS is provided and installed by the glovebox supplier.

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
Project • Breaker panels/breakers Load Center to project • Transformers Fixtures				
Automatic transfer switch	• Automatic transfer switch existing	• Installation by others	CG	Provide wiring to project.
Motor Control Centers (MCCs)/ distribution panels	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
DUST SUPPRESSION SYSTEM				
Dust suppression system (water misting and fogging system) • Water storage tank • Spray nozzles • Fog nozzles • Control module • Tubing • Skid	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
PLANT AIR SYSTEM				
Plant air system (to support the dust suppression system)	• Utilize plant air system equipment available INEEL resources	• Facilities Package Subcontractor (SPC-389) to install	CG	

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
BREATHING AIR SYSTEM				
Breathing air system	• Utilize breathing air system equipment available through INEEL resources	• Facilities Package Subcontractor (SPC-389) to install	CG	
FIRE PROTECTION SYSTEMS				
WES and RCS automatic sprinkler system • Sprinklers • Air supply • Piping • Notification equipment • Isolation valves	• Provided by Facilities Package Subcontractor (SPC-389), Fire Protection Subcontractor	• Facilities Package Subcontractor (SPC-389) and Fire Protection Subcontractor to coordinate installation	CG	
Fire detection and alarm system • Manual fire alarm stations • Occupant notification appliances • Data wiring • CO detectors • CO calibrating gas • Smoke detectors	• Provided by Facilities Package Subcontractor (SPC-389), Fire Protection Subcontractor	• Facilities Package Subcontractor (SPC-389) and Fire Protection Subcontractor to coordinate installation	CG	
INSTRUMENTATION AND CONTROL				
Monitoring and control • Data cabling • Variable	• Provided by Facilities Package Subcontractor	• Facilities Package Subcontractor (SPC-389) to	CG	

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
Frequency Drive	(SPC-389)	install		
Programmable logic control system • Programming cable • 75 ohm terminator for the ControlNet cable system • Cable connectors • Pre-wired terminal block for 1756-IF 16 (slot 2) • Pre-wired terminal block for 1756-IF 16 (slot 5) • Pre-wired terminal block for 1756-IF 16 (slot 7)	• By others	• Facilities Package Subcontractor (SPC-389) to install	CG	To be programmed by BBWI engineers and installed by Facilities Package Subcontractor (SPC-389).
RadCon counting/storage tables	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
CRITICALITY MONITORING SYSTEM				
Criticality alarm detectors and control console	• By others	• Facilities Package Subcontractor (SPC-389) to install	SS	

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
Criticality alarm control enclosure	• Facilities Package Subcontractor (SPC-389) to provide	• Facilities Package Subcontractor (SPC-389) to install	SS	
Exterior/interior critical alarm system (CAS) poles and alarms	• Facilities Package Subcontractor (SPC-389) to provide	• Facilities Package Subcontractor (SPC-389) to install	SS	
EMISSIONS MONITORING SYSTEM				
Sample lines	• By other	• Facilities Package Subcontractor (SPC-389) to install under the direction of system vendor	CG	
Data/power cabling	• Provided by Facilities Package Subcontracto (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
Emissions monitoring cabinet	• By other	• Facilities Package Subcontractor (SPC-389) to install under the direction of system vendor	CG	

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
Shrouded probes	• By others	• Facilities Package Subcontractor (SPC-389) to install under the direction of system vendor	CG	
CCTV SYSTEM				
CCTVS includes: • Cameral control units for digface cameras • Camera control unit for gloveboxes • Remote function control matrix • Monitor input select switch • Video equipment racks	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
CCTV cameras (8)	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
CCTV cathode ray tube monitors (5)	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
Video cassette recorders (6)	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389)	CG	

Equipment	Procurement Quality Assurance Approach	Construction Installation	Safety Category	Notes
Pan and tilt actuators (5)	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
Excavator control panel and video monitor display and mounting hardware	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
MISCELLANEOUS EQUIPMENT AND FURNISHINGS				
Personnel lockers	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	
Motorized pallet jack	• Provided by Facilities Package Subcontractor (SPC-389)	• Facilities Package Subcontractor (SPC-389) to install	CG	

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein.

BECHTEL BWXT, IDAHO (BBWI)

Subcontractor Requirements Manual

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910	OSHA Occupational Safety and Health Standards
29 CFR 1926	OSHA Health and Safety Standards for Construction

Unless otherwise specified, references in these specifications or on the subcontract drawings to other specifications, codes, standards or manuals which are part of these specifications, but not included herein, shall be the latest edition, including any amendments and revisions, in effect as of the date of this Specification.

SUBMITTALS:

Submittals include, but are not limited to:

Shop Drawings and Vendor Data: Copies of shop drawings and vendors' data, as required by the Vendor Data Schedule for materials and equipment to be furnished by the Subcontractor shall be submitted by the Subcontractor. When the Subcontractor proposes an "equal" item, data shall be submitted to the Contractor in such detail to clearly illustrate that the item, including components and fabrication thereof, or that adjustment of features to make the item "equal", meets requirements of the subcontract drawings and specifications. The Subcontractor shall submit data for "equal" approval and obtain the Contractor's approval before committing to purchase the proposed "equal" item.

Manufacturers' Operation and Maintenance Manuals: The Subcontractor shall furnish copies of installation, operating and maintenance manuals, for operating equipment and systems, as required by the Vendor Data Schedule and these specifications. Manuals shall be prepared by the manufacturers of the operating equipment or systems furnished and installed under these specifications.

Manuals shall be complete and shall include instructions and sufficient data for lubricating, start-up sequence, operating instructions, special test procedures or instructions recommended by the manufacturer, maintenance procedures, a complete parts list and recommended list of spare parts for normal expected maintenance. Wiring diagrams shall be furnished for electrically operated equipment.

The required number of manuals shall be furnished to the Contractor within 30 calendar days after final shop drawings or vendor data approval has been obtained by the Subcontractor.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY ASSURANCE:

Quality Assurance Program requirements shall exist to assure that work performed is in conformance with the requirements established by the drawings and this specification. QA Program criteria applicable to this scope of work is addressed in SC-5 of the Special Conditions and these specifications.

Standard Products: The materials and equipment furnished by the Subcontractor shall be standard products of manufacturers regularly engaged in the production of the type of materials and equipment required and shall be of the manufacturer's latest standard designs. Where two or more units of the same type and class of material or equipment are required, the units shall be the product of the same manufacturer, and shall be identical insofar as possible. The component parts of a unit of equipment need not be the products of the manufacturer.

SAFETY, HEALTH AND ENVIRONMENT:

In general work shall be in compliance with the applicable sections of 29 CFR 1910, 29 CFR 1926 and the BBWI Subcontractor Requirements Manual.

DELIVERY, STORAGE AND HANDLING:

All materials normally packaged shall be delivered to the site in the original, unopened packages with labels intact. Upon arrival, the Subcontractor shall inspect the materials or equipment for damage.

Materials and equipment shall be stored and handled in accordance with the manufacturer's instructions. Protect construction materials, equipment, flange facings, threads, machined or painted, and other exposed finished surfaces from damage.

PART 2--PRODUCTS

MATERIALS:

New Materials and Equipment: Materials and equipment received by the Subcontractor in a damaged condition shall be repaired or replaced by the Subcontractor as directed by the Contractor. Materials and equipment damaged by the Subcontractor shall be repaired or replaced by the Subcontractor.

Approved Equal: Whenever a product is specified by using a proprietary name, the name of a manufacturer, or vendor, the specific item mentioned shall be understood as establishing type, function, dimension, and quality desired. Other manufacturer's products will be accepted, provided sufficient information is submitted to determine that products proposed are equivalent to those named.

Existing Materials, Equipment and Structures: Existing materials, equipment and structures, including paint and protective coatings, involved under this Subcontract shall be thoroughly inspected by the Subcontractor before starting any work. Any defects or damages, the repair of which are not covered under these specifications or subcontract drawings, shall be reported in writing to the Contractor by the Subcontractor. The Subcontractor shall place reinstalled

operating equipment in an operating condition that is at least as good as it was at the time the Subcontractor started work.

Government Furnished Materials (GFE): Items shown on the subcontract documents as (GFE) are materials and/or equipment that is furnished by the Government to be installed by the Subcontractor. A complete and composite list of such material is attached to the Subcontract Specifications and is referred to as the Schedule "X" list.

Hazardous Chemicals and Substances: The Subcontractor shall comply with applicable requirements of 29 CFR 1926.59, Hazard Communication Standard.

PART 3--EXECUTION

CONSTRUCTION AND INSTALLATION:

General: Materials and equipment shall be erected or installed only by qualified personnel who are regularly engaged in the trades required to complete the work. The subcontract drawings show the general arrangement and space allocation of the equipment specified. It shall be the Subcontractor's responsibility to verify changes in conditions or rearrangements necessary because of substitutions for specified materials or equipment. Where rearrangements are necessary the Subcontractor shall, before construction or installation, prepare and submit drawings of the proposed rearrangement for approval.

Coordination of Work: Where new work and existing facilities are shown on the drawings, but are not located precisely by dimensions, the Subcontractor shall be responsible for proper location and clearances and for correcting discrepancies and interferences in the work which are a result of his operations. Work done by one trade that must be integrated with work of other trades shall be laid out with due regard to the work done, or to be done, by other trades; particularly if the work done by one trade depends upon completion or proper installation of work done by other trades. The Subcontractor shall cooperate in coordinating his work with work being done by others if their work must be integrated with the Subcontractor's work. The Subcontractor shall notify the Contractor at least one week prior to starting of the date on which the Subcontractor proposes to proceed with the work.

Workmanship: Work shall be done in a skillful and workmanlike manner. The Subcontractor shall do structural cutting, fitting, patching, repairing and associated work necessary for installation of equipment, piping and electrical conduits, etc. No major cuts or holes, not shown on the drawings, shall be made without prior approval of the Contractor. After the equipment and/or piping is installed, exposed holes, cracks and other defects shall be neatly patched and the patched areas shall match the adjoining materials and finish.

REPAIR AND RESTORATION:

Materials and equipment repaired or replaced by the Subcontractor shall be subject to acceptance by the Contractor.

PROTECTION:

Construction materials, equipment, flange facings, threads, machined or painted, and other exposed finished surfaces shall be protected from damage during construction.

END OF SECTION 01005

SECTION 01300 - SUBMITTALS

PART 1--GENERAL

SUMMARY:

This section specifies the administrative, technical and quality requirements for Vendor data submittals. Vendor data requirements are specified in individual specification sections or on the drawings, and tabularized on a Vendor Data Schedule. In the event of conflicting requirements, the submittal requirements prescribed in the individual specification section shall prevail.

The Subcontractor shall submit data, drawings, and other submittals specified. If the Contractor determines the Subcontractor's submittal to be incomplete or unacceptable, the Subcontractor shall make a complete and acceptable submittal to the Contractor by the second submission of a submittal item.

The Subcontractor shall be responsible for advising the Contractor of any submittal that may be delayed and which might, if further delayed, extend completion of the project.

Section Includes, but is not limited to:

The preparation, transmittal and delivery of documents by the Subcontractor to the Contractor as required in the "Submittals" subdivision of the specification section and as provided on the Vendor Data Schedule.

RELATED SECTIONS:

General Provisions, Subcontractor Requirements Manual, Special Conditions, Drawings, Vendor Data Schedule, and other sections of these specifications apply to this section.

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Y14.1 Drawing Sheet Size and Format

SUBMITTALS:

General Procedures: Vendor data, whether prepared by the Subcontractor or Subcontractor's subtier or supplier, shall be submitted as instruments of the Subcontractor. Therefore, prior to submittal, the Subcontractor shall ascertain that material and equipment covered by the submittal and the contents of the submittal itself, meet all the requirements of the subcontract specifications, drawings, or other contract documents.

Each submittal shall contain identification for each separable and separate piece of material or equipment, and literature with respect to the information provided in the specification and on the Vendor Data Schedule. Submittals shall be numbered consecutively for each different submittal.

Vendor Data Schedule: Vendor data required by the specification sections or the drawings to support design, construction, and operation of the project is identified on a Vendor Data Schedule. The Vendor Data Schedule provides a tabular listing by item number, drawing or specification reference, and description of the item or service. The type of submittal is identified by a "Vendor Data Code", and the time required to submit the item is identified by a "When to Submit" code. An "Approval" code specifies whether the submittal is for Mandatory Approval or for Information Only. One copy of routine paper or electronic file submittals are required; additional copies may be required by the Vendor Data Schedule. Electronic file submittals are preferred. Submittals that can not be scanned or provided electronically, such as material samples, will require 6 copies for Mandatory Approval and 4 copies for Information Only.

Or Equal Material or Equipment Submittals: All "or equal" materials, equipment or systems shall be identified and submitted for approval as required by the terms of the subcontractor.

An "or equal" submittal shall contain as a minimum all operating and physical parameters necessary to show that the material or equipment is equivalent to the specified material or equipment. All parameters shall be specifically identified by the submitter in the proposal. Exceptions or differences between the specified item and the "or equal" item shall also be identified.

If an "or equal" material, equipment or system is approved, the Subcontractor shall be responsible for backup material necessary to include the material, equipment or system in the technical documents. In most cases this includes "red lining" a set of design drawings, and specifications to provide an "Approved for Construction" set of specifications and design drawings which incorporate the changes caused by the "or equal" item. These "red line" drawings shall be submitted prior to use of the "or equal" item. Any calculations or other backup material necessary to show that changes are adequate shall be included with the "red line" drawings and specifications.

Construction Vendor Data Transmittal and Disposition Form: All vendor data shall be submitted to the Contractor using the Construction Vendor Data Transmittal and Disposition Form. The form provides the Subcontractor a convenient method to submit vendor data and provides the Contractor a means of dispositioning the submittal. The Subcontractor shall list the Vendor Data Schedule item number, a Vendor Data Transmittal tracking number (if applicable), the drawing or specification number reference, a Tag Number (if applicable), the submittal status (e.g., Mandatory Approval, Information Only, Re-submittal, or Or-equal), the Revision Level, and the item Description. The description should include the heat or lot number for items requiring Certified Mill Test Reports.

Disposition by the Contractor: The Contractor's comments and required action by the Subcontractor will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

1. "Work May Proceed." Submittals so noted will generally be classed as data that appears to be satisfactory without corrections.
2. "Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit." This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the Contractor prior to construction.
3. "Work May NOT Proceed. Revise and Resubmit." Submittals so dispositioned will require a corrected resubmittal for one of the following reasons:
   - Submittal requires corrections, per comments, prior to final review.
   - Submittal data incomplete and requires more detailed information prior to final review.
   - Submittal data does not meet Subcontract document requirements.
4. "Accepted for Use. Information Only Submittal." Submittals so dispositioned will generally be classified as Information Only for as-specified material and equipment.

Mandatory Approval code vendor data will be reviewed by the Contractor and receive an A, B, or C disposition. Information Only submittals without comments will receive a D disposition. A, B, and C coded dispositioned submittals will be returned to the Subcontractor. D dispositioned submittals will not be returned to the Subcontractor. The Contractor may provide internal review of Information Only submittals. In the event that comments are generated on an Information Only submittal, the submittal may be re-dispositioned B or C code and returned to the Subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the Subcontractor will not be required.

The Contractor will return dispositioned submittals with reasonable promptness. The Subcontractor shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

All vendor data requires a disposition of A or D prior to final project close-out.

PART 2--PRODUCTS (SUBMITTAL REQUIREMENTS)

CERTIFIED MILL TEST REPORTS:

Where specifically required by other sections, certified mill test reports (CMTRs) shall be provided. The CMTRs shall be issued from the manufacturer who actively produces the item(s) and/or material to which the CMTR applies or a certified test laboratory. Each CMTR shall include the following:

1. Applicable codes and standards (such as ASTM or ASME) for the item(s) and/or material to which the CMTR applies.
2. General description of the item(s) and/or material to which the CMTR applies.
3. Heat or lot number of the item(s) and/or material to which the CMTR applies.
4. Actual chemical composition and the physical characteristics of the item(s) and/or material to which the CMTR applies. The physical characteristics noted shall include ultimate tensile strength, yield strength and elongation as a minimum. Reporting of physical characteristics is not required in the case of weld filler material unless otherwise noted in the applicable specification subdivision.
5. Signature and organizational title of the individual authorized to certify the accuracy of the data indicated on the CMTR for the item(s) and/or material shown.

EQUIPMENT DATA:

Where specifically required by other sections, equipment data shall be provided. As applicable and except as otherwise specified, equipment data shall include the manufacturer's name and address, the model number, and specific information on performance, operating curves and data, ratings, capacities, characteristic efficiencies, catalog data, equipment dimensions, evidence of compliance with safety and performance standards, and other data required to fully describe the equipment. Data shall be submitted in sets covering complete systems or functioning units. The data shall also be identified with the tag number of the equipment or device for which the data applies.

INSPECTION AND TEST PROCEDURES:

Where specifically required by other sections, inspection and test procedures shall be provided. Inspection and test procedures shall include, as applicable: description of item or items involved, inspection or testing to be performed, a listing of testing agency and technical personnel to be used, description of equipment and facilities to be used, test prerequisites, test methods, test evaluation and acceptance criteria, safety precautions, sign-off requirements, methods for control and calibration of measuring and test equipment, proposed test record form, references to applicable portions of the subcontract documents, and detailed

procedures, methods, and criteria for evaluation and acceptance. Test procedures shall be prepared in accordance with the Subcontract Requirements Manual, PRD-5014 "Test Control".

INSPECTION AND TEST REPORTS:

Where specifically required by other sections, inspection and test reports shall be provided within 10 working days of such inspection or test. Inspection and test reports shall include, as applicable: identification of material or item inspected, inspection data, functional test data, date(s) and place(s) of inspection/tests, names of agencies and technicians involved, references to procedures and methods used, references to applicable portions of the subcontract documents, names of persons evaluating test results, identification of work failing to meet inspection/test acceptance criteria, and detailed description of corrective action taken. Test reports shall be provided in accordance with the Subcontract Requirements Manual, PRD-5014 "Test Control".

INSTALLATION, APPLICATION, AND ERECTION INSTRUCTIONS:

Installation, application, and erection instructions shall be provided where specifically required by other sections. Installation, application, and erection instructions shall be clear, concise, and detailed, and shall utilize drawings and pictures to the extent necessary. The instructions shall include procedures for delivery acceptance, unpacking, inspection, re-packing, storage, handling, preparation of supporting work, assembly, and incorporation of the material/equipment into the work. The instructions shall include sequences, precautions, and tolerances.

In general, the Contractor's Representative will inspect the work to the criteria and instructions prescribed in the manufacturer's installation, application and erection instructions. The Subcontractor shall not deviate from the written instructions without prior written approval and direction from the manufacturer; such approval and direction shall be submitted to the Contractor as an attachment to the manufacturer's installation, application and erection instructions.

MATERIAL AND EQUIPMENT LISTS:

Where specifically required by other subdivisions, material and equipment lists shall be provided. Material and equipment lists shall be complete for the work specified under the subdivision and shall include all materials, products, equipment, and fixtures, including consumables. Lists shall include manufacturer's name and address, trade or brand name, local supplier's name and address, unit quantities, and catalog numbers required to fully describe the item.

OPERATION AND MAINTENANCE (O&M) MANUALS:

Where specifically required by other sections, operation and maintenance manuals shall be provided.

Contents: O&M manuals for manufacturer's standard items shall, unless otherwise specified, be the standard publication issued for the product by the manufacturer.

O&M manual for special engineered items or systems shall, as a minimum, contain the following information when applicable, unless the information is requested and submitted separately:

1. Cover sheet identifying the project, site, Contractor, Subcontractor and identification of the specific equipment or system described therein.
2. Table of contents listing sections, paragraphs, subparagraphs, and the page numbers where each one starts.
3. General introduction and overall equipment and system descriptions, including purpose, function, and simplified theory of operation.
4. Safety considerations including load limits, voltages, capacities, speeds, temperatures, and pressures.
5. Start-up sequence instructions, operating instructions, and instructions for both normal and emergency shutdown sequences.
6. Recommended procedures and frequencies for preventive maintenance including inspection, tests, adjustment, lubrication, and cleaning.
7. Required preventative maintenance and frequency to ensure warranties.
8. Troubleshooting, checkout, repair, and replacement procedures.
9. List of test point locations for troubleshooting, and normal operating test values at each point provided.
10. List of lubricants and other consumables for each item of equipment, and approximate quantities needed per year; where possible, types of consumables shall be consolidated, with equipment manufacturer's approval, to minimize the number of different consumables required.
11. List of tools and equipment required for testing and maintenance.
12. Complete equipment list, supplier's equipment specifications, and equipment and product data.
13. Complete parts lists for each item of equipment reflecting the manufacturer's name, address, and telephone number; part number, nomenclature and exploded views of each assembly.
14. Spare parts list and information described in paragraph entitled "Spare Parts Lists".
15. Mechanical, electrical, and instrumentation schematics and diagrams for each item of equipment and the integrated systems.
16. Instrument/equipment calibration instructions, including calibration set points where applicable.

17. "As-Built" drawings and shop drawings.
18. Warranties including the name, address, and telephone number of the firm providing the warranty service.

O&M manuals shall be suitable for copying and microfilming.

PRODUCT DATA:

Where specifically required by other sections, product data shall be provided. Product data shall include descriptive material, such as catalog data, diagrams, color charts, and other data published by the manufacturer, as well as evidence of compliance with safety and performance standards. To demonstrate conformance to the specified requirements; catalog numbers alone will not be acceptable. The data shall include the name and address of the nearest service and maintenance organization that regularly stocks repair parts.

Product data submittals shall reference the applicable subdivision and drawings, and be complete for each item or unit of work.

SAMPLES:

Where specifically required by other sections, samples shall be provided. Samples shall be identical with final condition of materials or products proposed for the work. Two full sets of optional samples shall be provided when required. Information shall be provided with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards. If requested by the Subcontractor, one sample set may be returned to be incorporated in the work. If incorporated into the work such sample shall be labeled in an approved manner and the installed location recorded on "Redline" drawings.

SHOP DRAWINGS:

Where specifically required by other sections, shop drawings shall be provided. Each shop drawing submittal shall be complete and shall be accompanied by technical and performance data as necessary to fully illustrate the information in the shop drawings, or cross referenced to such data contained in previous submittals. Unless otherwise specified, submittals shall consist of black-line printed copies. Hard copies and an electronic copy shall be submitted where required by other specification sections. Electronic copies of CAD generated drawings shall be provided in a form that will transfer to the Contractor's software using IGES or custom software provided by the Subcontractor. Sepia type prints are not acceptable. One set of copies will be returned to the Subcontractor marked to show the required corrections or approval.

The tag number indicated on the design drawings shall identify all equipment or other devices on the shop drawings. The Subcontractor shall identify all equipment and devices

with tags or labels in accordance with the requirements specified in the respective subdivision.

The following additional submittals shall be required as indicated on the Vendor Data Schedule:

"Redline" Drawings: Copies of the shop drawings shall be updated to include all changes or modifications made during construction and to reflect the actual conditions of construction. Each drawing shall be marked "As-Built" and be signed by the Subcontractor representative and shall be suitable for XEROX copying or microfilming.

Title Block and Identification: On each shop drawing, a 1-1/2 x 2-1/2 in. space shall be provided for the Contractor's review status stamp. Each shop drawing shall include a title block showing:

1. Project name and location.
2. Name and address of Subcontractor or manufacturer as applicable.
3. Date, scale of drawings, unique drawing identification number, and referenced design drawing number.
4. Subcontractor's review and approval stamp or signatures.
5. Revision record including signatures and dates.

Preparation and Size: Details and information shall be clearly drawn, dimensioned (including tolerances), noted, cross referenced and shall be of such quality as to ensure legible B (11 x 17 in.) size photocopy reproductions from microfilm (by others). Drafting and drawing standards shall be consistent with the practices established by ANSI Y14.1 or other acceptable standards and as specified herein:

Where applicable, views shall be oriented so that plant north faces to the left or up.

Use of abbreviations shall be avoided where space permits spelling in full; if used, abbreviations shall be described in a legend on the drawing.

Types: Shop drawings shall be of the specific types specified in the respective subdivisions. If a specific type is not specified, drawing shall be the type most commonly required for the specific class of work subject to the Contractor's approval. The most commonly required types of shop drawings and drawing content (as applicable) are described hereinafter.

Connection Diagrams: Shall indicate the relationships and connections of devices and apparatus. They shall show the general physical layout of all controls, the interconnection of one system, or portion of system, with another, and all internal tubing, wiring, and other devices. For simple installations, connection diagrams and interconnection diagrams may be combined onto a common drawing.

Control Diagrams: Shall show the physical and functional relationship of equipment. Electrical diagrams shall show size, type, of the systems. Pneumatic diagrams shall be furnished where gas systems are used. For simple installations, control wiring diagrams may be combined onto a common drawing.

Composite Drawings: Composite drawings shall show the work of one trade with that of other trades in the same contract and the structural and architectural elements of the work. Composite drawings shall be in sufficient detail to show overall dimensions of related items, clearances, and relative locations of work in allotted spaces.

Detail Drawings: Shall consist of dimensioned fabrication and assembly drawings for all parts of the work in such detail to enable the Contractor to check conformity with the contractual requirements.

Elementary Diagrams: Shall indicate, in straight-line form, without regard for physical relationship, all supporting systems and elements of equipment and associated apparatus.

Layout Drawings: Shall be consolidated for all trades in the subcontract, and show to scale pertinent structural and fenestration features and other items, such as cabinets, required for installation and which could affect the available space. Mechanical and electrical equipment and accessories shall be shown to scale in plan, elevation and/or section, in their installed positions. Duct work, plumbing, and piping shall also be indicated. Submittals describing the various mechanical and electrical equipment items, which are to be installed in areas represented by layout drawings, shall be assembled and submitted concurrently with and accompanied by the room layout drawings.

Fabrication, Erection, and Installation Drawings: Shall indicate equipment arrangement and shall include dimensions, elevations, sections, and enlarged details showing proper methods of field fabrication, construction, and installation.

Interconnection Diagrams: Shall be to scale and indicate interface between associated units of equipment and between equipment and systems. Internal equipment connections shall be shown on the connection diagrams. For simple installations, connection and interconnection diagrams may be combined onto a common drawing.

Outline Drawings: Shall indicate overall physical features, dimensions, ratings, center of gravity, lifting points, service requirements, and weight of equipment.

Schematic Drawings: Shall show the functional flow of systems and their interfaces with facilities and other systems. Functional and physical interfaces shall be indicated. Schematics need not be to scale. Schematic may be structural, mechanical, electrical, instrumentation or any combination of these with respect to the equipment or systems to be installed.

Single-line Diagrams: Shall indicate, by means of single lines and simplified symbols, the paths and component parts of systems. Items shall be clearly labeled to indicate ratings and use in the system.

Wiring Diagrams: Shall identify all terminals, terminal blocks, and wires with wire numbers and colors. All wires within enclosures and all wiring connections to externally located equipment and devices shall be shown. For simple installations, wiring diagrams and control diagrams may be combined onto a common drawing.

Isometric Drawings: For piping systems, indicate three-dimensional piping layouts in the isometric format. Piping shall be represented as a single-line and in-line components shall be represented with standard drafting symbols.

SPARE PARTS LISTS:

Where specifically required by other sections, spare parts lists shall be provided. Spare parts lists shall include all spare parts and the current list price of each spare part. The spare parts lists shall also identify those spare parts, which each manufacturer recommends for maintenance at the site. Each manufacturer or vendor shall indicate the name, address, and telephone number of its spare parts source closest to the Idaho National Engineering and Environmental Laboratory (INEEL).

The Subcontractor shall cross-reference all spare parts lists to the equipment tag numbers designated in the specifications or on the drawings. If O&M manuals are specified for equipment, spare parts lists shall be submitted as part of the O&M manual.

CALCULATIONS:

Where specifically required by other sections, calculations shall be provided. Engineering calculations and analyses shall be fully checked by a qualified individual other than the originator, and shall be signed and dated as checked. All final submittals of calculations shall be bound and shall include the title and purpose of the calculation, a table of contents or index, complete list of references, design basis and complete list of assumption (if any), methodology, and sufficient information to allow independent verification of the calculation.

Calculations which are performed by computer or with computer assistance shall include a description of the hardware and software used, a description of the model employed if applicable, verification documentation for the computer program, and a copy of the computer input and output. All revisions to submitted calculations, as a result of comments by the Contractor or design changes by the Subcontractor, however minor, shall be resubmitted.

SPECIAL PACKAGING, HANDLING, OR STORAGE PROCEDURES:

Where specifically required by other sections, special packaging, handling, rigging, shipping, storage, or preservation procedures shall be provided. These procedures shall contain the following minimum requirements as applicable:

1. Measures taken to prevent damage during transit.
2. Detailed description of container design.
3. Overall dimensions and approximate weight of container and contents.
4. Recommended method for off-loading.
5. List of required special off-loading devices.
6. Special instruction for proper packaging and preventative maintenance during storage at the site.
7. Special instructions for marking.
8. Safety code labels, if applicable.

INTEGRATED MANUFACTURING, INSPECTION, AND TEST PLAN:

Where specifically required by other sections, an integrated manufacturing, inspection, and test plan shall be provided. The integrated plan shall itemize the manufacturing, inspection, and/or test procedure steps associated with initial material preparation through end product delivery. The plan shall incorporate "source inspection hold points" as specified in the individual section.

PART 3--EXECUTION

N/A

END OF SECTION 01300

SECTION 05060 - STRUCTURAL WELDING

PART 1--GENERAL

SUMMARY:

Section Includes, but is not limited to:

All structural welding on carbon steel, stainless steel and aluminum.

RELATED SECTIONS:

Welding of structural metals directly to ductwork or similar boundaries shall be made in accordance with the requirements of Section 15014 or 15016.

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC (ASD)	Specification for Structural Steel Buildings-Allowable Stress Design (ASD) and Plastic Design

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z49.1	Safety in Welding and Cutting

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ASNT SNT-TC-1A	Personnel Qualifications and Certification in Nondestructive Testing

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	Symbols for Welding and Nondestructive Testing
AWS A3.0	Welding Terms and Definitions
AWS B2.1	Specification for Welding Procedure and Performance Qualification
AWS D1.1	Structural Welding Code – Steel
AWS D1.2	Structural Welding Code - Aluminum
AWS D1.6	Structural Welding Code – Stainless Steel

AWS QC1 AWS Standard for Qualification and Certification of Welding Inspectors

AMERICAN SOCIETY FOR MECHANICAL ENGINEERS (ASME)

ASME Sect. V Boiler and Pressure Vessel Code (Nondestructive Examination)

IDAHO NATIONAL ENGINEERING AND ENVIROMENTAL LABORATORY (INEEL)

INEEL Welding Manual.

DEFINITIONS AND SYMBOLS:

Definitions for welding terms shall be in accordance with AWS A3.0 and weld symbols shall be in accordance with AWS A2.4, unless otherwise indicated.

SUBMITTALS:

Partial submittals shall be considered incomplete and will not be reviewed.

Submittals for welding of all materials include, but are not limited to the following:

Pre-weld Package

1. Welding procedure specifications and procedure qualification records. These procedures shall be referenced on the shop drawings, and erection drawings as applicable.
2. Welding personnel qualification records.
3. Procedures for the handling, storage, and control of filler and backing materials.
4. Filler metal manufacturer or independent testing lab certified mill test reports (CMTR) of actual (typical may be used for shielded metal arc electrodes) chemical properties and heat number identification for CMTR's on LSC & SS safety related items only filler metals.
5. The heat number shall be marked on the CMTR. The CMTR shall certify that the material has been inspected and tested in accordance with the requirements of the specification and that the results of the chemical analysis meet the requirements of the specification for the AWS material classification.
6. Cleaning procedures for stainless steel.
7. Subcontractor's procedures for identification and control of tools and equipment use for stainless steel.

Post-Weld Package

1. Weld histories including requirements in special conditions such as reports of each inspection, examination and test. Weld histories required on LSC & SS safety related items only.
2. Weld repair reports including weld identification, welder identification number, test procedure, reason for rejection, number of repairs required, and documentation that weld is repaired and accepted.
3. Shop drawings showing all welds. All necessary information such as location, size, weld preparation, etc., shall be shown. The drawings shall differentiate between shop and field welds. The weld procedures and filler material to be used shall be indicated.

Weld Repair Procedure

1. Detailed weld repair procedures.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

Codes and Standards Regulatory Requirements (Codes and Standards): Comply with provisions of the following codes and standards, unless otherwise specified herein:

AISC ASD	Specification
AWS B2.1	
AWS D1.1	
AWS D1.2	
AWS D1.6	

GENERAL:

Components with welds will not be accepted unless the welding has been specified or indicated in the design documents or otherwise approved. Welding shall be as specified in this Section except where additional requirements are indicated or are specified in other sections.

WELD PROCEDURE QUALIFICATION:

Off-Site Procedures: The Subcontractor shall establish and qualify Weld Procedure Specifications (WPS) for any off-site welding performed during this Subcontract in

accordance with the requirements of AWS B2.1, D1.1, D1.2, or D1.6 as applicable. Approval will not relieve the Subcontractor of the sole responsibility for preparing procedures in accordance with the above referenced specification.

The Subcontractor may use welding procedures from the INEEL Welding Manual listed in PART 3 Welding Processes paragraph for off-site welding if a letter is submitted as vendor data stating that these procedures are being adopted for use in performance of this subcontract.

On-Site Procedures: Welding procedures from the INEEL Welding Manual listed in PART 3 Welding Processes paragraph shall be used for on-site welding.

WELDER QUALIFICATION:

Off-Site: Off-site welding shall be performed by welders or operators qualified in accordance with AWS B2.1, D1.1, D1.2, or D1.6 as applicable. Welders or welding operators qualified to INEEL Welding Manual procedures can be used for off-site welding if the applicable INEEL weld procedures are identified and submitted as vendor data. When using INEEL Welding Manual procedures for off-site welding, welders shall be qualified at the INEEL Welder Test Facility.

On-Site: All on-site welding performed under this specification shall be performed by welders or welding operators qualified at the INEEL Welder Test Facility using the applicable procedures specified from the INEEL Welding Manual.

Certification: Upon successful completion of the qualification test, the welder shall be provided with a certificate card by the Subcontractor (off-site) or in compliance with the INEEL Welding Manual (on-site). The certificate shall state the welding process, codes, and procedures under which the welder is qualified, and individual who issued the certificate. The welder shall carry the certificate card when performing welding under this subcontract. The Subcontractor shall have on file documentation, affidavits, and records of testing and test results which qualified the welder for certification. These records shall be certified by the Subcontractor and shall be submitted to the Contractor as vendor data.

Welder's Identification: The Subcontractor shall assign each welder with an identifying number, letter, or symbol.

Renewal of Qualification: Renewal of qualification for a welder or welding operator working on-site shall be in accordance with the INEEL Welding Manual. Renewal of qualifications of a welder or welding operator working off-site shall be as required in AWS D1.1, D1.2, or D1.6 as applicable.

Nondestructive Examination Procedures: The Subcontractor shall establish detailed inspection procedures and acceptance criteria for each nondestructive examination required in accordance with the requirements specified in PART 3--EXECUTION - SOURCE AND FIELD QUALITY CONTROL and additionally as required to ensure conformance of the work to the subcontract requirements.

Subcontractor's Nondestructive Examination Personnel Qualifications: The Subcontractor's nondestructive examination (including visual examination) personnel shall be qualified for the applicable nondestructive testing method in accordance with the requirements of ASNT SNT-TC-1A for Levels I, II, or III as applicable. Qualification as an AWS Certified Weld Inspector is an acceptable alternative for visual examination. The Subcontractor shall have on file documentation, affidavits, and records of testing and test results that qualified the nondestructive examination personnel.

DELIVERY, STORAGE, AND HANDLING:

Except as otherwise specified, filler materials, backing materials, and fluxes shall be stored, handled and controlled in accordance with approved procedures. As a minimum the procedures shall include manufacturer's recommendations and the requirements of the INEEL Welding Manual Volume 2.

SAFETY:

As a minimum, safety precautions during welding shall conform to ANSI Z49.1 as well as any additional requirements specified in the subcontract documents.

PART 2--PRODUCTS

GENERAL:

Welding equipment, electrodes, filler material, and fluxes shall be capable of producing satisfactory welds when used by a qualified welder or welding operator utilizing qualified welding procedures.

MATERIALS:

Filler Material: All filler material used in fabrication shall comply with the applicable requirements of AWS D1.1, D1.2, or D1.6 as applicable and have an actual (typical may be used for shielded metal arc electrodes) certified material test report (CMTR) issued by the original manufacturer or independent testing laboratory performing material testing.

Straight lengths of bare filler metal shall be marked on each end with heat number and AWS material classification. Spools of bare filler metal shall be marked on the side of the spool with the heat number and AWS material classification.

Gases: Shielding and purge gas(es) shall be in accordance with the applicable weld procedure.

Liquid Penetrant: All liquid penetrant (PT) materials shall meet the requirements of ASME Section V, Article 24, SE-165, Method B, Procedure B-3, Visible Solvent-Removable Penetrants. Penetrant materials shall meet the requirements of Section V, Article 6, of ASME Code, for sulfur and halogen content regardless of the type of material to be examined.

PART 3--EXECUTION

WELDING OPERATIONS:

Both off-site and on-site welding shall be accomplished in accordance with specified code requirements and the qualified and approved welding procedure specifications using qualified welders and/or welding operators. The use of such procedures will not relieve the Subcontractor of his responsibility for producing weldments conforming to the specified workmanship requirements. Welding shall not be done when the quality of the completed weld could be impaired by the prevailing working or weather conditions.

WELDING PROCESSES:

Off-Site: Subject to approval of the Subcontractor's welding procedures, acceptable welding processes are:

1. Shielded Metal Arc Welding (SMAW)
2. Gas Tungsten Arc Welding (GTAW)
3. Flux Core Arc Welding (FCAW)
4. Gas Metal Arc Welding – Spray Transfer (GMAW)
5. Gas Metal Arc Welding – Pulsed (GMAW-P)
6. Submerged Arc Welding (SAW)
7. Stud Welding

Short Arc Gas Metal Arc Welding (GMAW-S) process is not permitted.

Other welding processes may be used subject to specific approval. The Subcontractor shall submit pertinent data and proposed application of said other welding processes for evaluation by the Contractor prior to performing weld procedure qualification.

ON-SITE AND OFF-SITE USING INEEL WELDING MANUAL:

Carbon Steel Tubular Sections, Plate and Structural Shapes: INEEL Welding Procedures C-2.11, C-3.5, C-6.10 or C6-13 as applicable.

Stainless Steel: INEEL Welding Procedures S-2.24, S-3.16, or S-6.13 as applicable.

Stainless Steel to Carbon Steel: INEEL Welding Procedure, CS-2.7, CS-3.04, or CS-6.9 as applicable.

Aluminum: INEEL Weld Procedures, A2.5, A2.19, A6.15, or A6.16.

Tools and Equipment: Tools and equipment used in the fabrication of stainless steel and nickel based alloys shall be free from corrosion and shall be maintained free of grease, carbon steel particles, or any other foreign matter detrimental to fabrication. Mechanical cleaning tools used for stainless steel shall not cause carbon steel to be embedded into the surface. Wire brush material shall be of a material compatible with the parent material. Grinding wheels shall be resin bonded. Metal removal tools, wire brushes, and grinding wheels shall not have been previously used for other than the parent material. The Subcontractor shall establish and maintain identification and control procedures for equipment and tools including wire brushes and grinding wheels.

Preparation of Base Metal: Surfaces within 2 in. of any weld location shall be free of any oil, grease, paint, or other material that would prevent proper welding or produce objectionable fumes while welding. If the joints of carbon steel are prepared by arc cutting, the surface shall be ground to bright metal by mechanical means before welding. Plasma arc or laser beam cutting of austenitic stainless steel is permitted provided the cut surface is machined or ground a minimum of 1/16 in. to bright metal.

Cleaning Stainless Steel: The weld joint and surrounding metal for at least 2 in. back from the joint preparation shall be cleaned before welding. Cleaning shall be accomplished by brushing with a clean stainless steel brush and by scrubbing with a clean lint free cloth moistened with an approved low (less than 35 ppm) chloride or chloride-free solvent. When the weld has cooled, remove all visible weld spatter, flux, arc-strikes, and scale, however, the base material thickness shall not be compromised. Stainless steels shall not be descaled with nitric-hydrofluoric acid solutions. Final cleaning shall be performed after inspection and when nondestructive testing is complete.]

Preheat and Interpass Temperature Requirement: Preheat and interpass temperature shall be in accordance with the welding procedure specification.

Welding Requirements: Completed welds shall provide a surface that is free from cracks, seams, laps, lamination, and porosity in excess of the specified acceptance requirements. Arc

strikes outside the area of permanent welds shall be avoided on base metal. Arc strikes shall be removed by grinding as described in cleaning paragraph.

Fillet Welds: Fillet welds shall be made to the size and length as indicated. Where length of welds is not specified, the weld shall be continuous for full length of joint. Where spacing of intermittent or staggered weld is shown, the spacing shall be considered maximum only.

Unless fillet sizes are indicated as maximum size, oversize welds shall not exceed the thickness of the thinner part joined. Fillet weld surface shall have a uniform transition from the joined material into the weld deposit. Undercut shall be limited to the requirement of AWS D1.1 D1.2, or D1.6 as applicable and unfused overlap of the weld deposit shall be unacceptable.

Groove Welds: Groove welds shall be 100% complete joint penetration welds unless otherwise indicated. Groove welds shall be made to the requirements of the drawings and specification.

Temporary Welds: Temporary welds shall be subject to the same welding procedure requirements as the final welds. Temporary welds shall be removed unless otherwise permitted by the Contractor. Surface of removed temporary welds shall be made flush with the original surface.

Backing Strips and Weld Runoff Plates: The use of backing strips and weld runoff plates is permitted on weldments. The backing strips and weld runoff plates shall be removed after welding, unless otherwise indicated. Surface of removed temporary welds shall be made flush with the original surface.

WELD REPAIRS:

Defects shall be completely removed by grinding or other approved means to clean, sound metal. Excavated areas shall be PT inspected by ASNT-TC-1A certified personnel to assure defect removal.

Repairs to correct weld defects shall be made using the same procedure used for the original weld or other previously authorized weld repair procedures.

Repaired areas shall be re-examined using the same inspection procedures by which the defect was originally detected and the inspection which was originally specified for the weld.

No more than two repair attempts will be allowed on any one weld.

Cutting out and rebeveling then rewelding is considered a weld repair.

No further attempts to repair shall be carried out without the written authorization of the Contractor.

Weld repairs subsequent to the first two repair attempts shall be made after receiving written approval of Subcontractor's repair procedures.

Arc Strikes: Cracks and blemishes caused by arc strikes shall be ground to a smooth contour but no more than 1/32 in. of the base metal shall be removed. Arc strikes extending more than 1/32 in. into the base metal shall be considered as a weld defect and repaired as specified. Ground arc strikes shall be subjected to PT examination.

FIELD QUALITY CONTROL:

GENERAL:

Components with welds will not be accepted unless the welding has been specified or indicated in the design documents or otherwise approved. Welding shall be as specified in this Section except where additional requirements are indicated or specified in other sections.

Inspections, examinations, and tests for welds and weldments shall be performed by qualified inspection, examination, and testing personnel in accordance with the approved procedures. All welds are subject to inspection by the Contractor's Representative who reserves the right to accept, reject or demand removal of welds which are in violation of this specification or the applicable welding procedure specification. The Subcontractor shall provide access for this activity.

WELD TESTING AND INSPECTION:

Visual Weld Inspection: All welds on structures or components designated as Safety Category "SS" or "LSC" shall receive a visual (VT) examination. Welds on structures or components designated as Safety Category "CG" shall receive a visual (VT) examination in accordance with the following table:

Complete and partial penetration groove welds	100% VT
Multi-pass fillet welds	100% VT
Single-pass fillet welds > 5/16"	100% VT
Single-pass fillet welds < or = 5/16"	30% VT

VT inspection shall be performed, evaluated and documented by the Contractor's Representative. Visual examination procedures shall be in accordance with D1.1 or D1.6 as applicable. The evaluation of indications and the acceptance criteria shall be in accordance

with statically loaded criteria of D1.1 or D1.6 as applicable. The evaluation of Aluminum indications and acceptance shall be per AWS D1.2, section 7.8.

LIQUID PENETRANT EXAMINATION:

PT examination shall be performed in accordance with ASME Section V, Article 6 using solvent removable penetrant.
Liquid penetrant inspection shall be performed, evaluated and documented by the Contractor's Representative as required by the weld repair portion of this section.

Evaluation of PT indications and acceptance criteria shall be in accordance with D1.1 or D1.2, D1.6 as applicable.

Contractor Inspection: Surveillance will be performed by the Contractors Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 05060

SECTION 05100 - STRUCTURAL STEEL AND MISCELLANEOUS METALS

PART 1 - GENERAL

SUMMARY:

The Subcontractor shall supply all labor, equipment, and materials required to construct items listed hereafter and as shown on the drawings.

Section Includes, but is not limited to:

1. Structural steel framing
2. Structural steel pipe supports
3. Structural steel equipment supports or platforms
4. Guard rails and similar fall protection components
5. Miscellaneous steel such as guard posts, anchors, and embedments.

RELATED SECTIONS:

05060	Structural Welding

REFERENCES:

The following documents including others referenced therein, form part of this Section to the extent designated herein.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC	Code of Standard Practice for Steel Buildings and Bridges
AISC (ASD) Design	Specification for Structural Steel Buildings - Allowable Stress (ASD) and Plastic Design

RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS (RCSC)

RCSC	Specification for Structural Joints Using ASTM A325 or A490 Bolts

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-7	Brush-off Blast Cleaning
SSPC Paint 25	Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (without Lead and Chromate Pigments)

The following specifications are referenced in regard to materials:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A36	Structural Steel
ASTM A53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A307	Carbon Steel Bolts and Studs, 60000 psi Tensile Strength
ASTM A325	High-Strength Bolts for Structural Steel Joints
ASTM A490	Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
ASTM A500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A572	High-strength, Low-alloy Columbium-Vanadium Steels of Structural Quality
ASTM A611	Steel, Sheet, Carbon, Cold-Rolled, Structural Quality
ASTM A653	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
ASTM A924	Sheet Steel, Zinc Coated (Galvanized) by the Hot Dip Process
ASTM A992	Steel for Structural Shapes for Use in Building Framing
ASTM B209	Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate
ASTM F959	Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners

SUBMITTALS:

Submittals include, but are not limited to:

Shop Drawings: Submit shop drawings including all shop and erection details, and members (with their connections) not shown on the Subcontractor drawings. All welds shall be indicated by standard welding symbols of AWS A2.4.

Erection: Prior to erection, submit an erection plan of the structural steel framing. This erection plan shall conform to the requirements of AISC Code of Standard Practice. The erection plan shall describe all necessary temporary supports, including the sequence of installation and removal. Plan shall show sufficient detail and instructions to ensure the structure has been evaluated for stability throughout the contract.

Materials: Certified copies of mill tests reports (CMTR) for structural steel for all structures or components designated as "SS" or "LSC".

Certificates of Conformance: Certificates of conformance for structural bolts, nuts and washers, screws or other fasteners.
See Section 05060 for welding submittals.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

QUALIFICATION FOR WELDING WORK:

See 05060 Structural Welding.

DELIVERY, STORAGE AND HANDLING:

Store material to permit easy access for inspection and identification. Protect members and materials from corrosion and deterioration.

Do not store materials in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials that do not meet these specifications.

PART 2 - PRODUCTS

MATERIALS:

Structural Steel W Shapes: ASTM A992, except where other type steel is indicated.

Structural Steel C, S, M, and HP Shapes: ASTM A36 except where other type steel is indicated.

Miscellaneous Steel Plates, Angles and Bars: ASTM A36, except where other type steel is indicated.

Cold-Formed Steel Tubing: ASTM A500, Grade B.

Steel Pipe: ASTM A53, Grade B, Type E or S.

Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.

Sheet Metal: ASTM A 924, galvanized steel of the thickness (gages) shown on the drawings. Screws, nails and accessories shall be galvanized.

Anchor Bolts: ASTM A 307.

Self Tapping Screws: Buildex Teks, hex head carbon steel #12 x 1-½" x 5/16 AF.

Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular hexagon type, low carbon steel.

High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:

Quenched and tempered medium-carbon steel, bolts, nuts and washers, complying with ASTM A 325 Type 1.

Electrodes: See Welding Section 05060.

Structural Steel Primer Paint: Primer shall conform to Painting Section 09900.

FABRICATION:

Shop Fabrication and Assembly: Fabricate items of structural steel in accordance with AISC ASD Specification.

Fabrication and assembly shall be done in the shop to the maximum extent possible.

Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except where welded connections are indicated. Provide high-strength threaded fasteners for bolted connections, except where otherwise indicated. Use 3/4 in. diameter unless otherwise noted. Install high strength threaded fasteners in accordance with Specification for Structural Joints Using ASTM A 325 or A 490 Bolts. All connections using high-strength threaded fasteners shall be considered "slip-critical" unless otherwise indicated. Acceptable methods for tightening of "snug-tight" bolts are (in order of preference) direct tension indicator tightening, turn-of-nut tightening; installation of alternate design bolts; and calibrated wrench tightening.

Weld Construction: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work. See welding specification Section 05060.

SHOP PAINTING:

General: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Do not paint surfaces to be welded or with "slip critical"

bolted connections. Apply two (2) coats of paint to surfaces which are inaccessible after assembly or erection. See 09900--Painting for finish painting materials and requirements.

Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale, and splatter, slag or flux deposits. Clean steel in accordance with SSPC SP-7 "Brush-off Blast Cleaning".

Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions.

PART 3 - EXECUTION

ERECTION:

Surveys: Check elevations of bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to the Contractor. Do not proceed with erection until corrections have been made or until compensating adjustments have been agreed upon with the Contractor.

Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads.

Anchor Bolts: Furnish anchor bolts and other connectors required for securing steel to foundations and other in-place work. Furnish templates and other devices as necessary for presetting bolts and anchors to accurate locations.

Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base prior to packing with grout.

Setting Bases and Bearing Plates: Clean all surfaces of bond-reducing materials. Set loose and attached base plates and bearing plates on wedges or other adjusting devices. Finish exposed surfaces, protect installed materials and allow to cure.

Field Assembly: Set structural steel accurately to lines and elevations indicated. Align and adjust various members before permanently fastening. Clean surfaces which will be in contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure within specified AISC Code of Standard Practice tolerances. Splice members only where indicated and accepted on shop drawings.

Comply with AISC ASD Specification and Code of Standard Practice for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

Field Connections: Do not use gas cutting in field for correcting fabrication errors in structural framing:

Bolted Connections: Install high strength threaded fasteners in accordance with "Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts." All connections using high-strength threaded fasteners shall be considered "snug-tight" unless otherwise indicated.

Field Welding: Welding shall be done in accordance with the AWS D1.1, the INEEL Welding Manual and applicable INEEL Welding Procedures Specifications. See Section 05060.

FIELD QUALITY CONTROL:

Contractor Supplied Testing: The Contractor's Representative will inspect high-strength bolted connections and welded connections and perform tests and prepare test reports unless noted otherwise. See Section 05060 for welding inspection.

Contractor Inspection: Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawing and specifications.

SUBCONTRACTOR SUPPLIED TESTING:

Shop Bolted Connections: Inspect in accordance with the Specification for Structural Joints Using ASTM A325 or A490 bolts.

END OF SECTION 05100

SECTION 07901 - JOINT SEALANTS

PART 1 - GENERAL

SUMMARY:

Section Includes, but is not limited to:

Seal joints in vertical and horizontal surfaces as indicated below:

1. Perimeter joints between building materials and facility floor structure
2. Joints in metal plate of facility floor system.
3. Perimeter joints of exterior openings where indicated.
4. Perimeter joints between wall surfaces and frames of openings.
5. Gasketing of assemblies
6. Other joints where noted.

RELATED SECTIONS:

N/A

SYSTEM DESCRIPTION:

Joint Sealants: Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 719	Standard Test Method for Adhesion and Cohesion of Elastormeric Joint Sealant Under Cyclic Movement (Hockman Cycle)
ASTM C 834	Standard Specification for Latex Sealants
ASTM C 920	Standard Specification for Elastomeric Joint Sealants
ASTM C 1193	Standard Guide for Use of Joint Sealants
ASTM D 1056	Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber

ASTM E 90 Standard Test Method for Laboratory Measurements of Airborne Sound Transmission Loss of Building Partitions and Elements

SUBMITTALS:

Submittals include, but are not limited to:

Product Data: Submit product data from manufacturers for each joint sealant product required:

Certification: Submit certification by joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for the Project that have resulted in construction with a record of successful in-service performance.

Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

DELIVERY, STORAGE, AND HANDLING:

Deliver Materials: Deliver materials to the Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

Store and Handle Materials: Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

SITE CONDITIONS:

Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40° F (4.4° C).

When joint substrates are wet.

Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

PART 2--PRODUCTS

MATERIALS, GENERAL:

Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

Colors: Provide a standard off-white color where applied to fabric enclosure wall surfaces and industrial gray on all other joints in carbon steel members.

ELASTOMERIC JOINT SEALANTS:

Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C 920 and other requirements indicated on each Elastomeric Joint Sealant Data Sheet at end of this Section, including those requirements referencing ASTM C 920 classifications for Type, Grade, Class, and Uses.

Additional Movement Capability: Where additional movement capability is specified in Elastomeric Joint Sealant Data Sheet, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for Uses indicated.

Available Products: Subject to compliance with requirements, elastomeric sealants that may be incorporated in the Work include, but are not limited to, the products specified in each Elastomeric Sealant Data Sheet.

TAPE SEALANTS:

Tape Sealant: Manufacturer's standard, solvent-free, butyl-based tape sealant with a solids content of 100% formulated to be nonstaining, paintable, and nonmigrating in contact with

nonporous surfaces with or without reinforcement thread to prevent stretch and packaged on rolls with a release paper on one side.

Available Products: Subject to compliance with requirements, tape sealants that may be incorporated in the Work include, but are not limited to, the following:

1. Pecora Corp., Extru-Seal Tape
2. Pecora Corp., Shim-Seal Tape
3. Protective Treatments, Inc., PTI 606
4. Tremco, Inc., Tremco 440 Tape
5. Tremco, Inc., MBT-35

JOINT SEALANT BACKING:

General: Provide sealant backings of material and type that are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

Plastic Foam Joint Filler: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.

Elastomeric Tubing Joint fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26° F (-32° F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

MISCELLANEOUS MATERIALS:

Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.

Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.

Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3--EXECUTION

EXAMINATION:

Examining joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

PREPARATION:

Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:

Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

Clean metal, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

INSTALLATION OF JOINT SEALANTS:

General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

Do not leave gaps between ends of joint fillers. Do not stretch, twist, puncture, or tear joint fillers. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.

Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

PROTECTION:

Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that installations with repaired areas are indistinguishable from original work.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

CLEANING:

Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

ELASTOMERIC JOINT SEALANT DATA SHEET NO. 1

Elastomeric Joint Sealant Designation: ES-1.

Base Polymer: Oligomeric Polyurethane.

Type: Multicomponent.

Grade: Non sag.

Class: 25.

Additional Movement Capability: 50% in either extension or compression.

Use Related to Exposure: Non traffic.

Uses Related to Joint Substrates: Excellent adhesion to most common building substrates. Primer required on some Architectural finishes.

Colors Available: 50 standard colors.

Available Products: DYMERIC 511 as manufactured by TREMCO or approved equal.

ELASTOMERIC JOINT SEALANT DATA Sheet NO. 2

Elastomeric Joint Sealant Designation: ES-2.

Base Polymer: Silicone.

Type: One part.

Grade: Non sag.

Class: 25.

Additional Movement Capability: 100% extension, 50% compression.

Use Related to Exposure: Non traffic.

Uses Related to Joint Substrates: Aluminum, glass, and concrete. Some materials with special surface characteristics, finishes, or coatings may require priming.

Colors Available: Six colors: precast white, off white, limestone, bronze, aluminum/stone, black.

Available Products: Spectrum 1 as manufactured by TREMCO or approved equal.

END OF SECTION 07901

SECTION 09900 - PAINTING

PART 1 - GENERAL

SUMMARY:

Section Includes, but is not limited to:

1. Touch up painting of Carbon Steel exhaust stack and associated members
2. Painting of Carbon Steel floor plate in the WES
3. Painting of Carbon Steel floor plate in the RCS.
4. Painting of all exterior exit stair, landing and rail assemblies.
5. Painting of all Carbon Steel within the RCS with and Epoxy finish
6. Painting of Carbon Steel platforms, stairs, landings and miscellaneous structural and non-structural members associated with the glovebox and drum-loadout enclosures (tents) assemblies.
7. Painting of miscellaneous interior and exterior metal structures including utility and equipment supports.
8. Painting of mechanical ductwork from HEPA filter bank to stack

Pre-finished Items: Unless otherwise indicated, do not include field painting when factory-finishing is specified for such items as (but not limited to) pre-finished partition systems, finished mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets, equipment and cast iron gratings.

Metal surfaces of anodized aluminum, chromium plate, copper, bronze, stainless steel and similar finished materials will not require finish painting, unless otherwise indicated.

Metal Fire Rating Labels: Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

SUBMITTALS:

Submittals include, but are not limited to the following:

Product Data: Submit manufacturer's technical information, including paint label analysis and application instructions for each material proposed for use.

Material Safety Data Sheets (MSD's): Submit MSDS's on all products used.

Samples: Submit manufacturer's standard color chips for selection by the Contractor. If a non-standard color is required to match an existing color, submit three paint samples on 12-in. square hardboard for approval by the Contractor.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

Applicator Qualifications: Engage an experienced applicator who is regularly engaged in the application and installation of, and has successfully completed, coating system applications similar in material and extent to those in this project.

Single Source Responsibility: Provide primers and undercoat material produced by the same manufacturer as the finish coats and as recommended for the particular substrate and finish coat.

DELIVERY, STORAGE, AND HANDLING:

General: Deliver materials to the job site in the manufacturer's original, new, unopened packages and containers bearing the manufacturer's name and label, and the following information:

1. Name or title of material
2. Product description (generic classification or binder type)
3. Manufacturer's name, stock number and date of manufacture
4. Contents by volume, for major pigment and vehicle constituents
5. Thinning instructions
6. Application instructions
7. Color name and number
8. Handling instructions and precautions

Storage: Store materials not used in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45° F (7° C). Maintain containers used in storage in a clean condition, free of foreign materials and residue. Volatile liquids and used wiping and cleaning rags shall be kept in tightly closed metal containers. After each day's work, empty paint cans and other waste shall be removed from the premises and disposed of as directed by the Subcontractor's representative. Only one day's supply of paint may be brought into the work area. Any extra must be removed from the work area at the end of each day unless otherwise approved by the Contractor. The Subcontractor shall store and handle all paint in a well ventilated area or room.

PART 2 - PRODUCTS

MANUFACTURERS:

Subject to compliance with requirements, provide products of one of the following:

1. Benjamin-Moore
2. Columbia Paint Company
3. Devoe and Raynolds Company (ICI)
4. Fuller-O'Brien (ICI)
5. The Glidden Company (ICI)
6. ICI Dulux (ICI)
7. Keeler & Long Inc.
8. Ponderosa Paint Company
9. Pratt and Lambert
10. Sherwin-Williams Company

MATERIALS:

Paint shall be well ground, shall not settle excessively, cake or thicken in the container; shall be readily broken up with paddle to a smooth consistency and shall show easy brushing properties. Products containing lead or known carcinogens shall not be used. All products used shall comply with VOC requirements.

Solids by volume for latex based coatings shall be not less than 30%. Solids by volume for alkyd based coatings shall not be less than 40%. Solids by volume for wood stains and transparent finishes shall be not less than 20%.

PAINT SCHEDULE (EXTERIOR):

FERROUS METAL:

Semi-Gloss (Flat where noted), Alkyd Enamel Finish:

1. Primer: Rust inhibitive metal primer (Keeler and Long No. 6040)
2. Topcoats: Semigloss, silicone-alkyd enamel (Keeler and Long P-Series)
3. Color: Industrial Gray (Keeler and Long, Light Gray 5504)

GALVANIZED METAL:

Semi-Gloss, Acrylic-Enamel Finish:

1. Primer: Galvanized metal primer.
2. First and Second Coats: Semigloss, exterior, acrylic-latex enamel.
3. Color: Industrial Gray

PAINT SCHEDULE (INTERIOR):

FERROUS METAL:

Semi-Gloss, Odorless Alkyd-Enamel Finish: One finish coat over an enamel undercoat and a primer.

1. Primer: Rust inhibitive, alkyd-based or epoxy-metal primer. (Keeler and Long No. 6040)
2. Undercoat: Interior, alkyd-enamel undercoat or semigloss, interior alkyd-enamel finish coat.
3. Finish Coat: Semigloss (flat where specifically noted), silicone-alkyd enamel (Keeler and Long P-Series)
4. Color: Keeler and Long, Light Gray 5504

NON-SLIP EPOXY (Horizontal walking surfaces including all interior metal floor plate and exterior metal exit steps and landings):

1. Surface Prep: Sandblasting to 2-3 mils of profile
2. Primer: Self priming Keeler and Long 8400 Series (applied 10-15 mils)
3. Slip Resistance: Alumina oxide grit sprinkled and cured
4. Final Application: Repeat primer, grit and cure

EPOXY (Interior of RCS structural coponents, equipment, and supports):

1. Primer: Keeler and Long No. 3200 Kolor-Poxy Primer in contrasting color to topcoat
2. Topcoat: Keeler and Long No. 3200 Kolor-Poxy
3. Color: Double application in contrasting colors to insure adequate coverage of each Industrial gray finish coat of all miscellaneous steel and Safety yellow finish coat on guard rails

GALVANIZED METAL:

SEMI-GLOSS, ACRYLIC-ENAMEL FINISH:

1. Primer: Galvanized metal primer.
2. First and Second Coats: Semigloss, interior, acrylic-latex enamel.
3. Color: Industrial Gray

Colors: Colors, except as specified hereinafter for Piping Identification and Safety Painting, shall be as specified and/or as otherwise selected by the Contractor from current color charts or chips submitted by the Subcontractor. The color charts or chips shall be made by the manufacturer of the paint or labels to be used on the work covered herein. If the same colors required are not available in ready mixed paint, the Subcontractor shall prepare special mixes and submit samples of such mixes to the Contractor for approval.

Identification Labels: Identification labels for piping identification shall be Brady "Quik-Labels" as manufactured by the W. H. Brady Company or equal. (Stenciling is acceptable.)

PART 3 - EXECUTION

APPLICATION AND WORKMANSHIP:

General: No paint shall be thinned or otherwise altered in any manner other than recommended by the paint manufacturer. All paint shall be applied in strict accordance with the manufacturer's instructions, unless specified otherwise herein.

NUMBER OF COATS:

New Work: One coat of primer and two coats of finish paint except as noted otherwise on the drawings or in these specifications.

Paint Film Thickness: Dry film thickness of paint films above substrate or existing paint surface shall be as recommended by the paint manufacturer for each coat. However, the accumulated dry film thickness above substrate or existing paint surface shall not be less than 2.5 mils. Dry film thickness on non-magnetic surfaces shall be determined by a wet film gauge. Dry film thickness is the wet film thickness multiplied by the percent of solids by volume of the paint.

Surface Preparation: All surfaces to be painted shall be clean, smooth, dry and free of corrosion. The Subcontractor shall follow the paint manufacturer's recommendations for surface preparation strictly for the particular substrate being painted and shall submit copies

of the surface preparation instructions as called for on the Vendor Data Schedule. All hardware, fixtures, fixture plate and similar factory finished items shall be removed or covered in an approved manner before painting is begun. All items shall be replaced and/or uncovered when the painting work is complete. Masonry and concrete surfaces shall be free of mortar splatters, caulking or other foreign matter. Welds that are not prime coated shall be cleaned by wire brushing.

Damaged Prime Coat or Factory Finish: Damaged shop prime or factory finish coats of paint of any material, fabricated steel or equipment to be installed shall be repaired by the Subcontractor. Chipped or scratched areas shall be sanded or wire brushed to bare metal, feathered and spot primed before finish paint is applied. All prime coats on structural steel and miscellaneous metals that have been damaged, or affected by welding during erection, shall be brushed, cleaned and painted with a prime coat after erection, except that painted concealed surfaces shall be painted before erection. The paint for repair of finish painting shall be the same color as the factory finish coat.

Protection: During painting operations, all equipment and materials, flange faces and other machined or finished surfaces, floors, furniture, plumbing and electrical fixtures and construction work, including window and door glass, that is not to be painted, or is factory finished, shall be protected from paint splatter with drop cloths, paper, masking tape or other approved means. Painted surfaces on existing work, not to be painted under this Subcontract, that are damaged as a result of the Subcontractor's operations shall be repaired by the Subcontractor by priming the touch-up as required to match the undamaged surfaces. Remove all oily rags and waste from the building each night. Take every precaution to avoid danger of fire.

Application: Paint shall be applied in such manner as to preclude runs, sagging, brush marks, holidays or other defects in the finished surface. (No spray painting will be allowed within buildings.) Each coat of paint shall have a slightly different shade of color so that each coat will be distinguishable from the preceding coat. No painting shall be done when the ambient temperature is less than 50°F or when the temperature during the drying period is apt to drop below 50°F. In areas of fresh painted surfaces where the temperature has dropped below 45°F during the drying period, the area shall be brought back to or above 45°F and the drying period extended to 48 hours. All paint shall, otherwise, be applied in strict accordance with the paint manufacturer's directions, including use of respirators where required by the manufacturer's instructions.

Cleanup: Upon the completion of the work, the Subcontractor shall remove all surplus materials and rubbish and remove all paint spots from hardware, equipment, floors, glass and walls, etc. He shall remove all excess materials and equipment from the premises and leave the area in a clean and orderly condition.

IDENTIFICATION OF PIPING SYSTEMS:

Definitions: The following piping identification requirements are based on the American Standards Scheme for the Identification of Piping Systems A13.1 with additions as stipulated herein.

Piping systems are defined as conduits for the transport of gases, liquids, and semi-liquids. This excludes systems which are concealed or in covered pipe trenches, but would include piping systems in service tunnels and pits.

Contents of piping systems shall be identified according to color classification, by a solid color band completely encircling pipe, at least 8 in. in length (longer when necessary to accommodate full identification labels and provide 2-in. end border), painted on pipe or pipe covering in every location where identification labels are required. Stencils may be used in lieu of labels. All exposed firewater piping shall be painted as opposed to using intermittent color bands.

Color Classification: Where a question arises as to proper color classification, the Contractor should be consulted. The following list of pipe identifications are those which will be used on this Subcontract:

	Background/Lettering
Water, Fire Protection	Red/White
(Sprinkler heads shall not be painted)	
Air (pressure in lb/sq in.)	Blue/White
Electrical Conduit	Orange/Black

Identification Labels: Identification shall be accomplished by use of labels or stenciling. Straight lines of pipe shall be identified at intervals of 20 ft and at least once in each room. Piping shall also be identified at approximately 2 ft from all turns, valves and upstream side of distributional fittings or branches (exception: Piping in service racks). Horizontal piping which runs only in a service rack shall be identified at intervals of 20 ft or at the point it leaves the room. Branch takeoffs from the horizontal runs in service racks to outlet cocks or valves, less than 10 ft in length, shall not be identified if in the same room.

The lettered label, besides identifying the materials in full English text (no abbreviations or codes), shall indicate unusual qualities of the pipe contents, i.e., hot, cold, pressure, in lb/sq in.

On service piping, either liquids or gas, apply black arrows of same height and with same background color as adjacent identification labels, to indicate direction of flow.

Application: Labels or stencils shall be applied to the pipe so that the lettering is in the most legible position. Lettering size shall be in accordance with standards specified in ASA-A13; however, nearest "Brady Labels" shall be acceptable (see excerpt from American Standard).

Pipes to be marked shall first be wiped clean of dirt, dust, grease and moisture. Apply label over color band, using pressure, so that it lies smooth and flat. Apply a brush coat of clear lacquer after label has been applied to pipe, making sure edges of label are well covered. Stencils may be used in lieu of labels without use of lacquer cover.

Administration Areas Exceptions: Identification stripping and labeling will not be required in administrative areas unless so directed by the Construction Engineer.

Size of Labels

Outside Diameter of Pipe of Covering (in.)	Width of Color Band A (in.)	Size of Legend Letters B (in.)
*¼ to ¾	8	½
¾ to 1¼	8	½
1½ to 2	8	¾
2½ to 6	12	1¼
8 to 10	24	2 ½
Over 10	32	3 ½

(All dimensions are given in inches.)

* See paragraph on small piping for tag requirements.

Small Piping: Where pipe diameters are too small to accept labels, apply background colors and labels (or stenciling) to rigid phenolic "signboards", sized to accommodate Brady labels, and hung with stainless steel bead chain from the piping.

Apply flow arrows to all sizes.

Valves, Etc.: Identify in a manner similar to "small piping".

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 09900

SECTION 13910 - WATER MIST FIRE PROTECTION SYSTEM

PART 1 - GENERAL

SUMMARY:

Section Includes, but is not limited to:

1. Layout, fabricates, install, and test a low-pressure water mist fire protection system including pipe, fittings, automatic nozzles, hangers, supports, earthquake bracing, and all necessary accessories and components to assure a complete and operable system.
2. The hydraulic calculations have been completed on the piping system shown and the design is adequate to supply the needed water flow. If the piping is changed significantly, new hydraulic calculations will be required to be submitted and approved.

SUBMITTALS:

Submittals include, but are not limited:

Shop Drawings: The system layout shall be submitted as a complete package for approval. Complete packages shall include, sway bracing calculations, sway bracing details, and piping method including make and model of all equipment used. Partial submittals will be considered as incomplete and will not be reviewed. The layout must receive an "A" or "B" designation by the Contractor prior to beginning of installation and shall comply with NFPA 13, & 750.

The Subcontractor shall submit all layout drawings for approval prior to construction. All drawings shall be completed on size D (22" X 34") CAD generated drawings. Lettering size shall be a minimum of 1/8 (.125)" inch for all lettering on the main body of the drawing. Border and title block shall follow format in this drawing package. Drawings shall be done using AutoCAD or a similar program, that generates dwg files, that are compatible with AutoCAD 2000 and use a simplex font. An electronic copy of the As-Built configuration shall be furnished.

Electronic copies of border and title block format, as well as the construction drawings are available upon request. An A/E Drawing Standard format is available upon request.

QUALITY CONTROL SUBMITTALS:

Procedures: The Subcontractor shall submit a hydrostatic test procedure. This procedure must be approved prior to any system be considered operational.

Certifications: A Contractor's Material and Test Certification for Above-Ground Piping shall be completed and accepted, for the work covered by this specification prior to final acceptance of the installation.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

RELATED SECTIONS:

Section 01300	Submittals
Section 09900	Painting
Section 16721	Fire Alarm Systems
Section 15320	Stationary Fire Pump

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein.

AMERICAN SOCITY FOR TESTING AND MATERIALS (ASTM)

ASTM A269	Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
ASTM A403/A351M	Standard Specification for Wrought Austenitic Stainless Steel piping Fittings

AMERICAN WELDING SOCIETY

AWS A5.8	Specification for filler Metals for Brazing and Braze Welding (Classification BcuP-3 or BcuP-4)

FACTORY MUTUAL (FM)

Fire Protection Approval Guide

INTERNATIONAL CONFERENCE OF BUILIDNG OFFICIALS (ICBO)

IBC	International Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13	Standard for the Installation of Sprinkler Systems

NFPA 750	Standard for the Installation of Water Mist Fire Protection Systems
NFPA 72	National Fire Alarm Code
NFPA 20	Standard for the Installation of Stationary Fire Pumps

UNDERWRITERS LAB

Fire Protection Approval List

SYSTEM DESCRIPTION:

Reference Drawings: The project drawings do not attempt to show complete details of the building construction that affect the water mist system installation. The drawings in part are diagrammatic and do not show all offsets, fittings, valves, equipment, etc. It is absolutely essential to study the architectural, structural, mechanical, and electrical drawings and confer with the various trades involved. To assure that there is no conflict between the water mist system and the work of other trades. The hydraulic calculations have been completed on the piping system shown and the design is adequate to supply the needed water flow. If the piping is changed significantly, new hydraulic calculations will be required to be submitted and approved.

System Description: The water mist fire protection system shall be installed in the three gloveboxes installed in the WES. The systems shall be designed for an ordinary hazard, group I occupancy. The gloveboxes will be constructed of mostly noncombustible materials. The system shall be of the low-pressure type having a maximum of 175 psig operating pressure. The system nozzles will be automatic type Grinnell AM24 AquaMist, quick response, k= 0.64, ordinary temperature (155°F). Design requires that all nozzles within a glovebox be designed to operate at the same time. The maximum spacing is 97 inches by 97 inches or 65.3 ft^2.

Water Supply: The water supply will be from a 750 gallon grade level water storage tank supplying water to a positive displacement fire pump having a capacity of 25 gpm @ 150 psig minimum.

Piping: All above ground piping used in this project for water mist system shall conform to the Product section of this section. All piping shall be labeled.

Seismic Bracing: Earthquake sway bracing shall be provided based upon using a "G" factor of 0.5. Calculations, using the zone of influence method, showing the forces on the attachments shall be done to verify that the minimum requirements outlined are not exceeding the allowable strengths of listed equipment or allowable strength of the building structure at the point of attachment. Details of the sway bracing shall be provided on the shop drawings and bracing calculation sheets.

The Subcontractor shall be responsible for coordinating with the building manufacturer to assure the structure is capable of supporting both the static and dynamic loads imposed by the automatic sprinkler system layout. The forces developed at the point of connection to the structure must be taken into account and approved by the building structural designer.

Hangers: Design shall be designed for pressures in excess of 100 psi

Water Mist Nozzles: Nozzles shall be ordinary temperature, nominal K value of 0.64, pendent, throughout the glovebox.

Spare water mist nozzles shall be provided in accordance with NFPA 750. A wall mounted metal cabinet adjacent to the water supply shall be provided to contain the 3 nozzles along with a wrench.

QUALITY CONTROL:

Qualifications: The Subcontractor for the fire sprinkler system shall have a NICET Certified Engineering Technician (CET) in Fire Protection with a minimum Level III rating responsible for overseeing the preparation of the shop drawings and installation. This person shall be required to certify that the shop drawings are in accordance with this specification and all the regulatory requirements. The CET shall sign all drawings.

Manufacturers: Firms regularly engaged in the manufacture of fire sprinklers and piping accessories of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

Installer: A firm with at least 3 years of successful installation experience on projects with fire sprinkler piping similar to that required for this project. The installing Subcontractor shall be licensed as a Fire Protection Sprinkler contractor, by the State of Idaho.

Materials: Provide water mist nozzles, piping, fittings, and devices with a UL listing and/or FM approval unless a specified product is only covered by one of the agencies.

Regulatory Requirements (Codes and Standards): Comply with the provisions of the following codes and standards unless otherwise specified herein.

NFPA 13
NFPA 750
NFPA 72
NFPA 20

DELIVERY, STORAGE AND HANDLING:

All materials shall be delivered to and stored at the job site in a manner that will prevent foreign material from getting inside the piping and valving.

SEQUENCING /SCHEDULING:

The static and dynamic loads associated with the fire protection system must be coordinated with the building structural design.

PART 2 - PRODUCTS

MATERIALS AND EQUIPMENT:

Water Mist System Piping: Stainless steel piping shall be seamless 304L, Schedule 40, conforming to the requirements of ASTM A269.

Pipe Fittings: Reduction in pipe size shall be made with one-piece reducing fittings. Bushings will not be acceptable. ASTM A 403/A 403M for stainless steel.

Water Mist Nozzles: All nozzles shall be listed and approved for use in the occupancies described above.

Flow Switch Riser: The check valve in the riser shall have a removable faceplate and be equipped with trim consisting of two pressure gages and a main drain connection, Victaulic Series 712S Swing Check Valve.

CONTROL VALVE:

Ball Valve: A ball valve with weatherproof actuator housing, have a positive indication for the open and closed position. It shall be Victaulic Series 721S ball valve with gear operator.

Electric Bell: The electric bell shall be Potter PBA12010 or approved equal with BBK-1 Weatherproof back box.

Check Valves: In line check valves shall be equipped with a removable face for easy inspection and maintenance.

Water Flow Vane Switch: Vane type water flow alarm switch with built in recycling pneumatic retard and two sets of SPDT contacts shall be provided as part of the Valve trim. Potter VSR-V Vane Type Flow Switch.

Valve Supervision: Supervision shall be provided on the valves using a Potter Model PMS magnetic plug type supervisory switch. The switch shall be waterproof and have two sets of Form C snap action contacts.

Hangers: Threaded side beam brackets, TOLCO Fig. 58 with bolt and hex nut fastener.

C-Type beam clamps with retaining strap, TOLCO Fig. 65, 66. Retaining strap TOLCO Fig. 69.

Ring Hanger, TOLCO Fig. 2, 2NFPA, and 200.

Surge Restrainer: TOLCO Fig. 25.

Straps: Straps shall be UL Listed and FM approved, ¼" bolt holes, Carbon Steel. Grinnell Short Strap, Fig. 262.

Earthquake and Sway Bracing: Sway bracing shall be UL listed.

Inspector Test Valve: Test valve shall be a ¼ turn ball valve. The valve shall have a working pressure of 300 psi or greater and contain a chrome plated or stainless steel ball. Victaulic Series 722.

Signs: All drain and test valves shall have identification signs per NFPA 13. Lettering shall be a minimum of 1-in. high white letters on red background.

LABELING:

See Section 09900 for the requirements labeling all pipe and devices.

PART 3 - EXECUTION

INSTALLATION:

Only new and approved water mist nozzles, piping, fittings, hangers and devices shall be employed in the installation of the system.

Inspector Test Connections: Inspector test connections shall use a ¼ turn ball valve.

Auxiliary drains shall be provided with a ¼ turn ball valve and plug. The drains shall be located to drain to a safe location.

Stainless steel screwed fittings shall utilize TEFLON tape and/or TEFLON paste to prevent galling.

FIELD QUALITY CONTROL:

One set of approved drawings shall be maintained on the project site during construction. The Subcontractor shall redline all changes daily. The redline drawings shall be incorporated on the "as-built" design drawings by the Subcontractor.

SUBCONTRACTOR SUPPLIED TESTS:

Test of Water Mist System: All new water mist system piping shall be hydrostatically tested at not less 200-psi pressure. All leaks shall be repaired and system retested.

Contractor Inspection: The Contractor's Representative shall witness all hydrostatic pipe testing. Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 13910

SECTION 13911 - DRY PIPE FIRE PROTECTION SYSTEMS

PART 1 – GENERAL

SUMMARY:

Section Includes, but is not limited to:

1. Layout, fabricate, install, and test the dry fire sprinkler systems including pipe, fittings, sprinkler heads, hangers, supports, earthquake bracing, and all necessary accessories and components to assure a complete and operable systems. The hydraulic calculations have been completed on the piping system shown and the design is adequate to supply the needed water flow. If the piping is changed significantly, new hydraulic calculations will be required to be submitted and approved.
2. Layout and Install complete dry fire sprinkler systems for the inside of the PCS enclosure. The system shall be designed to provide a design density of 0.20gpm/ ft^2 over the most 1950 ft^2 of floor space or the entire enclosure floor space which ever is smaller.
3. Layout and Install a complete dry fire sprinkler system for the inside of the WES enclosure. The system shall be designed to provide a design density of 0.20gpm/ ft^2 over the most 1950 ft^2 of floor space or the entire enclosure floor space which ever is smaller.
4. Connect to the existing dry fire sprinkler system mains located on the pipe rack approximately 10 feet east of the east wall of the WES.
5. Use the air compressor that has been installed in the Temporary Riser Building and is dedicated to the filling of the two Dry Sprinkler System Risers. The compressor is installed with the capacity to fill up either system to the minimum pressure required to reset the individual Dry Sprinkler Systems within 30 minutes of the time that filling begins. The air will be dried using desiccant air dryers to minimize the moisture that enters the systems during pressurization.

SUBMITTALS:

Shop Requirements: The fire suppression system layout shall be submitted as a complete bound package for review and approval. A complete package shall consist of all working plans; sway bracing calculations, and other vendor data required by this specification. See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

Working plans shall contain all information required by NFPA 13 and include all piping, offsets, fittings, hangers, sprinklers, ductwork, lighting, and obstructions. Partial submittals will be considered as incomplete and will not be reviewed. The layout must be reviewed and receive an authorization to proceed by the Contractor prior to beginning of installation.

The Subcontractor shall submit all layout drawings for review and authorization to proceed prior to construction. All drawings shall be CAD generated and completed on size D (22 × 34 in.) drawings. Lettering size shall be a minimum of 1/8 (.125)" inch for all lettering on the main body of the drawing. Border and title block shall follow format in this drawing package. An electronic copy in AutoCAD 2002, DWG format, shall be furnished in addition to the original drawing plots. Electronic copies of border and title block format are available upon request. An A/E Drawing Standard format is available upon request.

QUALITY CONTROL SUBMITTALS:

Procedures: The Subcontractor shall submit a hydrostatic test procedure. The procedure shall describe where water will be obtained and how it will be disposed after the testing in a safe manner. The water will not be allowed to flow uncontrolled anywhere over the buried waste.

Certifications: A Contractor's Material and Test Certification for Above-Ground Piping shall be completed and accepted, for the work covered by this specification prior to final acceptance of the installation.

Building Manufacture Letter: A letter from the building manufacture approving the method, location, and forces used in the attachment of earthquake sway bracing.

RELATED SECTIONS:

Section 01300	Submittals
Section 13505	Pit 9 Fire Protection Water Supply System

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein.

FACTORY MUTUAL (FM)

FM Approval Guide Fire Protection

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

IBC International Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13 Standard for the Installation of Sprinkler Systems

UNDERWRITERS LAB

Fire Protection Equipment List

SYSTEM DESCRIPTION:

Reference Drawings: The drawings do not attempt to show complete details of the building construction, which affect the fire protection installation. The drawings in part are diagrammatic and do not show all offsets, fittings, valves, equipment, etc. It is absolutely essential to study the architectural, structural, mechanical, and electrical drawings and confer with the various trades involved. To assure that there is no conflict between the fire protection system and the work of other trades and to assure that the owner secures the best arrangement of work consistent with the use of space. The hydraulic calculations have been completed on the piping system shown and the design is adequate to supply the needed water flow. If the piping is changed significantly, new hydraulic calculations will be required to be submitted and approved.

Layout Requirements: This specification and the Regulatory Requirements outlined in Quality Control shall govern this layout.

Piping: All above ground piping used in this project for dry fire systems shall conform to the Product section of this section. All exposed piping shall be labeled as a minimum.

Air supply: The dry pipe valve and associated air maintenance device shall be arranged to avoid tripping due to water pressures of 160 psig. The air supply for this installation shall be obtained from an air compressor located in the sprinkler riser building. The air compressor is provided with an air dryer and filter assembly. The system is sized based upon a dry pipe sprinkler system sized at 500 gallons as a minimum.

Obstructions: Sprinkler heads shall be installed under all obstructions to include ducts, lights, equipment, cable trays, racks of piping, or any combination of equipment per the requirements for obstructions.

Seismic Bracing: Earthquake sway bracing shall be provided based upon **NFPA 13 using a "G" factor of 0.5**. Calculations, using the zone of influence method, showing the forces on the attachments shall be done to verify that the minimum requirements outlined are not exceeding the allowable strengths of listed equipment or allowable strength of the building structure at the point of attachment. Details of the sway bracing shall be provided on the shop drawings and bracing calculation sheets.

The Subcontractor shall be responsible for coordinating with the building manufacture to assure the structure is capable of supporting both the static and dynamic loads imposed by the

automatic sprinkler system layout. The forces developed at the point of connection to the structure must be taken into account and approved by the building structural designer.

Hangers: Layout shall be based upon pressures in excess of 100 psi. Hangers attaching to steel purlins shall be attached by connecting into the web of the purlin using side beam brackets.

Flushing Connections: Flushing connections shall be provided.

Sleeves and Penetrations: All pipes penetrating metal floors shall be sleeved. Sleeves shall be caulked to prevent water entry from outside the building with an approved sealant. Sleeves shall extend 1 in. above the finished floor.

Sprinklers: Sprinklers shall be ordinary temperature, K=5.6 or 11.2, upright or dry pendent, throughout the structures. Spacing of sprinklers shall be for standard or extended coverage as shown on the drawings for listed for ordinary hazard occupancies.

Spare sprinkler heads shall be provided in accordance with NFPA 13. A wall mounted metal cabinet adjacent to the exterior wall shall be provided to contain the sprinklers along with a wrench for each type of sprinkler head. The cabinet shall have a hinged cover.

Head Guards: Guards shall be placed around all sprinklers, which are subject to mechanical damage, in particular the sprinklers installed under the gloveboxes.

Control Valves: All valves controlling fire protection water supplies shall be provided with electronic valve supervision devices.

Inspector Test Connections: Inspector test connections shall use a ¼ turn ball valve. Test connection valve shall be located at the hydraulically remote end of the system, as shown on the drawings, approximately 5 ft maximum above finished floor. It shall drain to the exterior of the building.

Low Point Drains: Low point drains shall be arranged with drum drip connections to allow system drainage without the use of a ladder. The drains shall discharge to a safe location, outside of the PCS and WES to the exterior of the enclosures. Drain valves shall consist of ¼ turn ball valves and plugs.

Splash Blocks: The Subcontractor shall furnish splash blocks at the main drain and all other exterior discharge locations that do not drain onto asphalt.

QUALITY CONTROL:

The sprinkler contractor for the fire sprinkler system shall have a NICET Certified Engineering Technician, (CET), in Fire Protection with a minimum Level III rating in Fire Protection responsible for overseeing the preparation of the layout drawings and installation. This person shall be required to certify that the drawings are in accordance with the specification. The CET shall sign all drawings.

Manufacturers: Firms regularly engaged in the manufacture of fire sprinklers and piping accessories of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

Installer: A firm with at least 3 years of successful installation experience on projects with fire sprinkler piping similar to that required for this project. The installing Subcontractor shall be licensed by the State of Idaho as a Fire Protection Sprinkler Subcontractor.

UL Listed or FM Approved: Provide sprinkler piping, fittings, and devices with a UL listing or FM approval.

Regulatory Requirements (Codes and Standards): Comply with the provisions of the following codes and standards unless otherwise specified herein.

NATIONAL FIRE PROTECTION ASSOCIATE (NFPA)

NFPA 13 "Standard for the Installation of Sprinkler Systems"

Upon completion of the automatic sprinkler system installation, the individual with the NICET level III responsible for the system layout, shall conduct the final main drain test and verify the installation has been installed in accordance with the working drawings and meets the layout requirements of this specification.

DELIVERY, STORAGE AND HANDLING:

All materials shall be delivered to and stored at the job site in a manner which will prevent foreign material from getting inside the piping and valving.

SEQUENCING /SCHEDULING:

The static and dynamic loads associated with the fire protection system must be coordinated with the building structural design.

DELIVERY, STORAGE AND HANDLING:

All materials shall be delivered to and stored at the job site in a manner which will prevent foreign material from getting inside the piping and valving.

SITE CONDITIONS:

PART 2 - PRODUCTS

MATERIALS AND EQUIPMENT:

Sprinkler Piping: Galvanized steel piping shall be welded or seamless, Schedule 40, conforming to the requirements of ASTM A-53, type S, grade A, or ASTM A-795, type S. Schedule 10 UL listed or FM approved, or ASTM A-795, type S. Welding will not be allowed on galvanized piping unless the weld effect area is hot dip galvanized after welding is completed.

Pipe Fittings: Reduction in pipe size shall be made with one-piece reducing fittings. Bushings will not be acceptable. Plain-end fittings are not acceptable.

Welded fittings on galvanized piping will not be allowed unless the weld effected zone of the fitting and associated piping is hot dip galvanized.

Pipe Couplings: Flexible couplings in pipelines shall be Victaulic Style 75, 77, or approved equal. The grooving machine used to prepare the piping to except the flexible couplings shall be approved for use with the coupling by the coupling manufacture. Rigid couplings in pipelines shall be Victaulic Style 005, 07,

Plain end and welded couplings shall not be allowed.

Sprinkler Heads: All heads shall be listed and approved for use in the occupancies described above.

1. Dry type heads shall be Reliable Model F3, Ordinary Temperature-155°F, brass finish.
2. Upright and pendent heads shall be Viking Model M Extended Coverage Ordinary Hazard ELO with a K=11.2, ordinary temperature with a spacing of 18 feet by 18 feet, brass finish.
3. Upright and pendent heads shall be Viking Model M, ordinary temperature, K=5.6, standard response brass finish.

Plain end and welded couplings shall not be allowed.

Sprinkler Heads: All heads shall be listed and approved for use in the occupancies described above.

1. Dry type heads shall be Reliable Model F3, Ordinary Temperature-155°F, brass finish.
2. Upright and pendent heads shall be Viking Model M Extended Coverage Ordinary Hazard ELO with a K=11.2, ordinary temperature with a spacing of 18 feet by 18 feet, brass finish.
3. Upright and pendent heads shall be Viking Model M, ordinary temperature, K=5.6, standard response brass finish.

Sprinkler Guards: Shall be of the type, which can be installed after the sprinkler head is installed. Guards shall be Victaulic model V27 or V34.

Spare Sprinkler Heads: The Subcontractor shall furnish spare sprinkler heads in accordance with NFPA 13 and a sprinkler head wrench in the wall-mounted metal cabinet adjacent to the riser. Cabinet shall have a hinged cover. Subcontractor shall provide the spare sprinkler cabinet.

Air Dryer: Air dryers shall be the inline desiccant type designed to provide a dew point of at least -20° F. A coalescing type prefilter shall be provided with the air dryers.

Pipe Stands: Pipe stands shall be adjustable and have a pipe saddle. Tolco Fig. 319 with Fig. 317 saddle.

Check Valves: Swing Check: Swing check valves shall have a removable faceplate to allow for maintenance of the valve without the need of removing it from the system. Viking model G-1.

Wafer Check: Wafer check valves shall contain an o-ring sealed clapper, torsion spring loaded, and be of the butterfly valve type. Grinnell, Model F512

HANGERS:

1. Threaded side beam brackets, TOLCO Fig. 58 with bolt and hex nut fastener.
2. C-Type beam clamps with retaining strap, TOLCO Fig. 65, 66, Retaining strap TOLCO Fig. 69.
3. Ring Hanger, TOLCO Fig. 2, 2 NFPA, and 200.
4. Surge Restrainer: TOLCO Fig. 25.
5. Straps: Straps shall be UL Listed and FM approved, ¼" bolt holes, Carbon Steel. Grinnell Short Strap, Fig. 262.

Earthquake and Sway Bracing: Bracing shall be UL listed or designed by a registered Professional Engineer in the State of Idaho. TOLCO.

Inspector Test Connections: Inspector test connections shall use a 1/4-turn ball valve. The test connection valve shall be located at the hydraulically remote end of the system, approximately 6 ft maximum above finished floor and drain to the exterior of the building.

Signs: All drain and test valves shall have identification signs per NFPA 13. Lettering shall be a minimum of ½ in. high white letters on red background.

Splash Block: Splash blocks shall be constructed of concrete.

IDENTIFICATION OF PIPING:

See Section 09900 Painting, for the requirements of painting and labeling all pipe, fittings, hangers, Galvanized piping need not be painted but shall be labeled.

PART 3 - EXECUTION

FIELD QUALITY CONTROL:

Installation: Only new and approved sprinklers, piping, fittings, hangers, and devices shall be employed in the installation of the sprinkler system.

One set of approved fire protection layout drawings shall be maintained on the project site during construction. The Subcontractor shall redline all changes daily. The redline drawings shall be incorporated on the "as-built" layout drawings by the Subcontractor.

ACCEPTANCE TESTS:

Test of Dry Pipe System Piping: All new fire system piping shall be hydrostatically tested at not less than 225-psi pressure for two (2) hours with no visible leakage. All leaks shall be repaired and system retested.

Dry System Air Test: In addition to the standard hydrostatic test, an air pressure leakage test at 40 psi shall be conducted for 24 hours. Any leakage that results in a loss of pressure in excess of 1½ psi for the 24 hours shall be corrected.

Compressor Test: Verify the air compressor starts and stops at the correct air pressures for the dry pipe valve selected. Pressures must not exceed the maximum pressure or go below the minimum pressure as recommended by the dry pipe valve manufacture.

END OF SECTION 13911